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ABSTRACT

"FUTURES with Jaime Escalante" is an educational video series aimed at increasing interest in mathematics. The series of 12 videotapes is aimed at junior high and early high school students and demonstrates that mathematics is a prerequisite for many careers. The series seeks to change students' attitudes toward mathematics and defuse the ideas that mathematics is uninteresting and unappealing by presenting role models that communicate mathematics in a way that stimulates student interest. This report describes the perceived needs that inspired the series, how the series was conceptualized, production of the series, evaluation of its impact on teachers and students when utilized, how the series is disseminated to the intended audience, and plans for further development to improve and expand the series based on research evaluating its effectiveness. Research evaluating the series indicated that FUTURES effected long-term improvements in student attitudes towards mathematics, science, and careers. Appendices to the report include: (1) a statement of public recognition of Jaime Escalante; (2) a description of the Outreach Network; (3) a list of organizations endorsing FUTURES and sample letters of endorsement from these organizations; (4) a summary of student response to the FUTURES presentation pilot; (5) a summary of teacher response to the FUTURES video workshop; (6) a sample of the FUTURES Teacher Survey; and (7) a research summary of the FUTURES student survey. (Contains 37 references.) (MDH)

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FUTURES with Jaime Escalante:

Development of a Successful, Research-based

Instructional Video Series

Shelley L. Beckmann, Ph.D.

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FUTURES with Jaime Escalante:

Development of a successful, research-based instructional video series.

Shelley L. Beckmann, Ph.D.

Foundation for Advancements in Science and Education

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INTRODUCTION

"FUTURES with Jaime Escalante" is an educational video series aimed at increasing student interest in mathematics. This series is designed to help bring about an atmosphere where students are studying math because they want to study it, not because they are "supposed to".

The series is based on the premise that presenting the relevance of mathematics in an exciting, dynamic manner will lead to enhanced interest in math and, hence, to an active pursuit of knowledge in this arena.

FUTURES has been remarkably successful in its first season. First airing in 1990, FUTURES has been utilized by more states, faster, than any Instructional Television (ITV) series ever offered by PBS, which bespeaks its utility and value to states, districts and individual educators.

FUTURES does increase student interest in mathematics. In an independent in-class study, FUTURES was shown to effect long term improvements in student attitudes towards math, science and careers.

Many elements contributed to the success of the FUTURES series. A fundamental ingredient of this production has been the predominant attention to the artistic quality of the series. This is reflected in such things as the writing, interview styles, professional standards for filming, intricate editing to attain the desired impact, exceptional care with aural aspects of the final product and several other artistic elements. Though not the focus of this report, professional production standards are a critical aspect of this successful video series.

In this report, we review the background, development and production of the FUTURES series with the intent of relaying important lessons we have learned in developing a successful, research-based instructional video series. This information may help others utilize and expand upon this work.

EXECUTIVE SUMMARY

Background:

It has been apparent for decades that the educational system in the United States is in need of assistance. However, a variety of societal factors makes it difficult to determine how this might best be done. Lowered standards of performance, rising crime, widespread drug abuse and diminished moral standards are all involved in this disturbing situation.

One means of reversing this complicated trend is to isolate and support individual factors that effect a positive change. By identifying and supporting specific factors that

work, we can create a changing attitude towards education and a reversal in the downtrend of our educational system.

The Foundation for Advancements in Science and Education (FASE) has had a long term initiative to identify and broadly implement educational methods that work in the classroom. We have been innovators in the development of direct support by businesses for effective educational programs.[11]

One of our first projects was to develop funding for the Jaime Escalante math program at Garfield High School in Los Angeles. Our initial work with this program involved getting businesses to provide funds for items that were not covered by the school budget including materials, Saturday lunches, the after-school math program and all aspects of the summer teaching program.

Working with Mr. Escalante, it became apparent that he was remarkably successful in motivating his students to learn. His approach -- marrying classroom work with interesting demonstrations of math principles in operation and active interaction with professionals in the field -- is effective in catching student interest and in relaying to them WHY they need to know math. This approach led to development of the concept behind the FUTURES series.

FUTURES:

FUTURES is based on the idea that mathematics education faces not only a teaching barrier but a marketing barrier as well. In both informal and formal surveys, teachers have repeatedly stated that they feel comfortable teaching math. Where they request help is in motivating their students to learn. FUTURES is aimed at answering this need.

To accomplish its purpose, FUTURES must communicate. It is targeted towards junior high students. Therefore we chose a medium with which they are familiar and production characteristics they find appealing. FUTURES is a fast-paced, highly professional video product. It includes special guests chosen specifically for their familiarity to this audience and their ability to communicate to kids.

In this series we deliberately marry the classroom to real life work places. Our intention is to link the classroom to the actual work environment for these students so that they will make the connection that math is a subject that will help them to get where they want to go.

Outreach was initiated early, often providing invaluable research information as channels were developed. Our outreach program is designed to develop long term relationships with the individuals we contact. We attend meetings, encourage communication and send out periodic mailings to build an active team that is informed of milestones and research results.

Throughout the production and dissemination of the FUTURES series, we have had an ongoing research initiative to ensure that the final product meets the needs of teachers, administrators and students.

By working from the start with mathematicians, math teacher educators, teachers, engineers, industry business persons and students we ensured that the FUTURES series aligned with current workable pedagogical principles in mathematics and met practical classroom needs. At the same time, our outreach initiative developed a strong supportive base prior to the series' release.

The success of FUTURES has been greatly enhanced by the repute of Mr. Escalante. Over the years, Mr. Escalante has earned a national reputation based on his phenomenal results at Garfield -- an inner-city school located in a low income area heavily influenced by gangs. Further, the predominately Hispanic students at Garfield are frequently learning English as a second language. Mr. Escalante's national acclaim assisted greatly in the initial support and the widespread interest in the FUTURES program.

All of these factors combined to generate a series that meets the needs of teachers, truly motivates students, and is broadly distributed.

THE NEED FOR THE SERIES

Education Statistics:

Education in mathematics and science has become a major concern in the United States[16,24,25,29,36]. The U.S., formerly among the world's leaders in technical education, is now ranked near the bottom of industrialized nations in science and mathematics preparation[15].

In an Educational Testing Service (ETS) report, when 13-year-olds from six industrial nations were tested for basic math skills, the U.S. students scored at the bottom. The irony of these results is that 68% of the American children tested said, "I am good at mathematics", while only 23% of the Koreans tested stated the same opinion. Korea was the top scoring country[10].

Science and mathematics achievement scores for U.S. high school students dropped markedly in the 1970's. Although recent results are encouraging[8,23], the level of skill in mathematics necessary for the technology of the future is not being achieved by today's students[22,37].

While test scores for high school students show less competence in higher level mathematics now than 20 years ago, new jobs are requiring greater competence[16]. In addition, as the number of technical jobs increase, fewer college-bound students are planning to go into the fields of math, science and engineering[12].

This mismatch between educational level and job requirements is of major import to American industry[2,5,6,9,13,16]. The number of Americans trained in mathematics is simply too small. Companies spend huge sums on in-house training to bring employees up to the level they should have attained in school. Many companies now recruit foreign graduates for technical positions.

The picture is an especially dismal one for minorities and for females. Though improving, the performance in math and science for these groups is particularly poor[8,17]. It is discouraging that an ETS examination of 21 to 25-year-old Americans showed that less than 10% could correctly fill out a catalog order form or select the less expensive item in a grocery store. It is even more disturbing that only 0.8% of the blacks and 3.8% of the Hispanics tested could perform these tasks[17].

Geometry and algebra have been described as the "gateway courses" to higher education. Minority or lower-income students who master these courses are as likely to succeed in college as their higher-income, white counterparts.[28] However, minority participation in these courses lags. For example, Hispanics constitute 58% of the high school students in the Los Angeles Unified School District (second largest district in the U.S.), yet only 28% of the 1988 graduates who took the subjects identified as prerequisites to college admission were Hispanic (LA Unified School District, personal communication).

Minority students are especially poorly prepared for the increasingly technical job market that they will face. The effect of inadequate education is reflected in employment statistics. U.S. unemployment among non-engineering trained blacks and Hispanics is at least six times greater than among members of these minorities who are engineers[35].

Although the educational level of minorities and females is relatively poor, it is becoming increasingly recognized that these students will become a majority of the future work force. The future economic health of our country depends on preparing them for technical positions[4,8,16,19,20,24,25,26,33].

What steps can we take to improve this situation?

Rationale:

The language of science and technology is mathematics. However, the attitude among most students is that math is boring and irrelevant[8]. Even college-bound students learn math in a rote manner[32]. Unless corrected, students will be poorly trained in math and functionally illiterate in science and technology. They will have a serious inability to perform in the workplace.

Most observers agree that children will overcome many more obstacles when they are personally involved in a subject and will tend to avoid or neglect those subjects in which they can find no personal interest or relevance. The correlation between attitude and

achievement in science education supports this view[23].

Perhaps the most powerful means of convincing students of the importance of mathematics is directly relating it to work[10], yet teachers have little contact with the practicing scientific and engineering communities and are frequently unable to tie real-life applications to the basic concepts they must teach[20].

FUTURES is built on the idea that the first step in correcting a student's reduced achievement in mathematics is to increase his or her interest in math.

This product is designed to motivate rather than teach.

The Medium:

Each year the average number of hours spent viewing television rises. Pictures - as shown in comics, magazines, television, and the movies - are persuasive and popular routes of communication to children.

Minority children in particular, impeded from learning by poverty, drugs, violence, and an often unstable family atmosphere, can be reached directly through their most popular entertainment and informational medium - television[18].

We have built a series that incorporates many of the aspects of successful motivational television to better reach the student:

1. Televised material has the advantage of bringing the outside world into the classroom, thus widening the range of a student's experience[30]. Several motivational programs have taken advantage of this aspect of TV in their approach to science education[7,14,21,34].

2. Children pay attention to televised material that is comprehensible to them[3]. Due to the low level of mathematics skills demonstrated by most American students, the mathematics principles incorporated in FUTURES were chosen to be recognizable and easily grasped by students with a wide range of skills.

3. In the classroom, demonstrations of science and technology in action have been used to attract student interest. This type of approach appears to be effective[23] and is becoming increasingly popular; in a broad-based study, it has been successfully used in teaching scientific principles to non-science majors[27]. FUTURES excels at bringing realistic applications of math principles into the classroom.

FUTURES is built on these concepts. It is a fast-paced but easily comprehensible series. It directly relates concepts taught in the classroom to real life application, makes extensive use of minority and women role models in technical fields, and takes advantage of the visual excitement and action possible with video.

Aimed at junior high and early high school students, this series shows that math is a prerequisite for many of the careers they find most appealing. Mr. Escalante, as the host, adds his own teaching style -- grabbing student interest by active discussion of the concepts presented and lively classroom demonstrations.

Children are susceptible to a wide range of messages from a number of different media. Many of the most powerful images affecting children are transmitted via television. By giving them programs to watch which show a world of opportunity through math and its applications, FUTURES encourages them to decide to study this subject.

This is the type of tool that teachers have repeatedly stated they need. Indeed, when independently surveyed, most teachers report (over 90%) that they are confident that they can teach math and have the tools to do so. These same teachers report that they lack the tools to inspire interest in children and that this is what they need in a video series (66%)[31].

FUTURES provides a unique resource for teachers to actually show, rather than just explain or preach about, the importance of studying math.

Selection of Jaime Escalante:

Jaime Escalante was selected as host of the FUTURES series for several reasons:

First, he is an extremely effective educator. Mr. Escalante's success at Garfield High School in Los Angeles has received national acclaim. In the last decade at Garfield, Mr. Escalante's students have produced over 600 passing grades of three or better on the Advanced Placement Calculus AB and BC exams.

His program to create excellence in mathematics education sparked a remarkable reversal in the educational performance of the school, even among students who never studied with Mr. Escalante. Whereas there were no Advanced Placement courses offered in 1977, by 1991 AP courses were offered in 14 areas with 570 exams taken by the 376 students participating that year. Garfield now prides itself on having more students take AP tests than any school in California.

Second, Mr. Escalante has become a bright symbol of what the country considers to be a great teacher. This has been a welcome contrast to the criticism of teachers by newspapers and the continuous bad news of the deepening American education crisis, especially in math and science, that has been commonplace in the lay media. Also, given the critical lack of minority male teachers, the importance of Mr. Escalante's example -- inspiring young male minorities to become teachers -- is significant.

Third, Mr. Escalante is an interesting teacher because his style is extremely energetic. He insists that classes in math are fun despite the hard work that he requires. His

flamboyant, sometimes humorous and light approach to teaching, quite aside from any other consideration, lends itself well to the visual medium.

Fourth, while there are many superb teachers, Mr. Escalante's life and methods have been elevated to a unique level of public exposure. (Appendix I) The film Stand and Deliver was released in 1988. This film inspired people because it portrayed the true-to-life motivational skills of an effective teacher. Both parents and teachers responded favorably to this surprise hit film. Stand and Deliver brought Mr. Escalante into the limelight, rocketing the success of Mr. Escalante's program into the public eye.

Mr. Escalante's participation is an essential part of the success of FUTURES.

CONCEPTUALIZATION OF THE SERIES

Series Goals:

The FUTURES series is aimed at motivating students to learn math. Often, student attitudes towards math are not conducive to learning. To many, knowing math is not considered "cool" or valuable or conducive to popularity; those who excel in mathematics are more often considered nerds than role models for their peers. In addition, mathematics is considered difficult and there is little awareness of application for the subject. Overall, students have few or no answers to the question "What do I need this for?"

To change these attitudes, it is imperative to defuse the fixed ideas regarding math while communicating the application of mathematical concepts in a manner that evokes student interest. This area -- motivating students to learn math -- is the one for which teachers most often request assistance.

Within this context, the purposes of our approach are:

* To "position" competence in math with success in careers that are appealing to students.

* To link the mathematical information and principles the student is studying now to his or her future application of that data.

* To motivate students to study math by showing them that a world of opportunities, especially for minorities and women, are open to those with good math skills.

* To inspire confidence in young people by showing role models who have succeeded in life by using math, especially women and minorities.

* To provide teachers with an effective tool to stimulate interest, using a concise format. This series promotes teacher/student exchange regarding math principles

and affords teachers new options to amplify or supplement their lesson plans.

- To further the idea that any student can accomplish his or her goals, given the *"ganas"* (*"ganas"* translates loosely as "urge or desire to get ahead"). Mr. Escalante has helped kids of all ability levels maximize their potential by increasing their desire to learn. This concept is repeated throughout the series.

This series incorporates several of the concepts identified as core elements of successful programs for educating disadvantaged students in mathematics and science[1]. The series stresses the "real world" application of mathematics and science concepts, increases awareness of career activities, and provides a vehicle for enhanced support of educational goals[25].

Guidelines:

The producers developed several guidelines for the production of an appealing final product. FUTURES is based on the following guidelines:

1. The segments must focus on one or a few key points, not a multitude of points. This program is primarily targeted at students who are not interested in math education. The purpose is to involve these viewers and make them more comfortable with math, not overwhelm them. The specific math principle covered must be easily understood.

2. The professions featured must be broad-based, realistic and applicable to students across a wide range of socioeconomic strata. They cannot be limited to those careers which, factually, only a few children will enter. Gender and ethnicity must be positively portrayed to give children of either sex or any ethnic background the hope that they can be part of one or more of these exciting professions.

3. The segments must be of broadcast quality and be competitive against today's viewing alternatives. They cannot be didactic or stuffy, as children's interest will be lost. The artistic, technical and communication quality of the series must be first-rate and commensurate with, or surpassing, other programs of comparable subject matter.

4. Each segment of the series must be self-contained and designed to be appreciated on its own, but also engrossing enough to turn audience members into regular viewers.

5. Forays into the workplace must honestly relate the behind-the-scenes reality of the field. It is imperative that we communicate a realistic view of the nuts and bolts involved in working in each profession.

Throughout production, our internal benchmark for the desired effect of each episode was: "If no adults were around, might students say 'Would you like that job?'" We worked to create the effect of making jobs realistic enough for the students that they both

connected math to it and were interested enough to discuss it, talking with each other, saying "That job we just saw -- I'd like a job like that!" or something similar.

PILOT PRODUCTION

The FUTURES series was conceived as a result of direct observations of effective educational approaches coupled with an objective look at the fixed ideas that can impede education. The idea that one facet of handling student interest in math was a marketing rather than an education phenomenon, coupled with the incredible public response to the movie Stand and Deliver, opened the door to production of the series.

The pilot episode of the series was described in a 3-page concept paper, including a one-page introductory dialogue (Figure 1) that exemplified the type of student attitudes that the series is designed to address.

This concept paper was sufficient to garner the interest of some of the key businesses and foundations already interested in the Escalante math program, including most notably ARCO, the Carnegie Corporation of New York, and IBM. Funds were donated by these organizations to produce the pilot episode of the FUTURES series. As initial funds were raised, production of the pilot tape was initiated, so that this series became a real, ongoing program rather than just a "good idea". Production of a tangible product facilitated fundraising to a remarkable degree.

Our philosophy has always been to maintain active communication with the education community. While initial funds were raised, we were conducting direct informal research. We have consistently used this to monitor and upgrade our products. Prior to filming of the pilot, we researched what students watched on TV, topics that are appealing to a junior high audience, math concepts appropriate for these students, who these students look to for leadership, and celebrities whose names were recognized by students and who also had personal interests that overlapped with the content of FUTURES. This initial research resulted in a clarification and more detailed description of the pilot video concept.

It was imperative that this pilot tape be of the highest quality in order to both meet production goals and facilitate full funding for the series. Therefore, we enlarged our team to include experienced professionals in the field to execute this project. Steve Heard, the creator of the series concept, retained the executive producer as well as co-writer positions to ensure that the creative direction was completely understood by the film producers and that the original concept was fully implemented in the final product.

The pilot was produced based on the guiding principles above. The pre-release version of the "Automotive Engineering" episode was an 18-minute videotape containing classroom scenes showing the interaction of Mr. Escalante with his students, interviews with celebrities and professionals in the field, and attention-grabbing visuals.

Introduction

INTERVIEWER: Do you know what you want to do when you get out of school?

STUDENT: I want to make some money. I want a job somewhere.

INTERVIEWER: Do you feel school is helping you get ready for a job?

STUDENT: No. I mean I don't know what this stuff's got to do with jobs, you know?

INTERVIEWER: Can I ask you some questions about "jobs"?

STUDENT: Sure, why not.

INTERVIEWER: What's an engineer actually do?

STUDENT: (Laughs) I guess something to do with engines. I don't really know exactly. Maybe makes things, you know.

INTERVIEWER: What about people who build cars. Do you think math or physics is important to them?

STUDENT: I guess so...yeah, probably. But I'm not sure why.

INTERVIEWER: What is a corporation?

STUDENT: Well, it's a company usually with a building. A big one. They own a lot of equipment and hire lots of people.

INTERVIEWER: What are some of the things heads of companies do during the day?

STUDENT: I don't know. Talk on the phone? Tell other people what to do. Or maybe buy things for the company.

INTERVIEWER: When you see the freeways filled with people going to work every day, do you ever wonder just what do these people do all day?

STUDENT: Yeah (laughs), I do. My friends wonder too. We all do. I mean what do they do? Some jobs like in restaurants and stuff, you know, I see what they do. But all these other jobs, I don't know.

INTERVIEWER: When you are in school, do you think about how what you are studying might apply to something you will be doing in the future?

STUDENT: Not really. I mean I go to school like everyone else. It's something I gotta do. But am I thinking, "Hey, now what's this got to do with the job I'm gonna get?" No, I don't think that.

Figure 1. Introductory Dialogue: This dialogue was part of the initial concept description used to develop funds for the pilot episode of FUTURES.

Throughout this period of pilot production, the overriding concern was to produce a high quality product that fully duplicated the intent of the series. This pilot would then bring about the necessary support to allow production of the full series to occur.

PRODUCTION OF THE SERIES

Fundraising:

Production of the pilot episode was vital to development of full funding for the series. As soon as the pilot tape was completed, in February of 1989, we implemented our outreach efforts in earnest. (Figure 2)

The initial outreach initiative began with direct mailing of the pilot videotape to over 600 individuals representing businesses, foundations, engineering societies, education groups, minority groups, teacher's organizations, broadcast networks and systems and mathematics organizations.

The purpose of this work was to obtain detailed response to the pilot episode, so as to increase the quality of the series as a whole, and to create the broad awareness and support of the series necessary to secure funding for production of the full series.

This intensive outreach effort included direct calls to each of the videotape recipients. The goals of these follow up calls were to:

* Ensure that the individual saw the pilot,
* Obtain recommendations and other feedback,
* Obtain endorsements and letters of recommendation for the series,
* Include reviews of FUTURES in the organization's newsletter,
* Provide opportunities for screenings of the pilot, and
* Develop opportunities for the full membership to view the series.

Mathematics and Teaching Organizations: Contact with mathematics and teaching organizations was very influential in obtaining funding for this series. In follow up calls, we specifically requested that their responses be formalized as letters of recommendation or endorsements and, where appropriate, as notices in the group's newsletter on the release of the FUTURES series.

The extremely positive response to the pilot episode garnered a plethora of such endorsement letters that were very influential when asking organizations to back tnis

Figure 2: TIME LINE OF PRODUCTION

		Fundraising	Production	Outreach	Research
1988	Jun				Informal research
	Jul		Series Concept Developed		
	Aug	Fundraising Begins	Concept Paper Completed		
	Sep	ARCO commits to pilot			
	Oct		Pre-Production of Pilot		
	Nov				
	Dec		Taping Begins		
1989	Jan	Fundraising begins for full series			
	Feb		Pilot Tape Completed	Mailing to over 600 Individuals	Monitor Initial Response to Pilot
	Mar			Gather Endorsements	
	Apr	Full funding of pilot achieved			
	May				
	Jun				
	Jul				
	Aug	ARCO commits as prime of full series		Screening at FirstView	Survey of ITV Executives
	Sep		Start of Production Research		
	Oct				
	Nov				Report of Student's Response to the Pilot
	Dec				Independent study by RCL begins
1990	Jan				
	Feb		Pre-production begins		Initial RCL report
	Mar		Distribution Contract Signed Start of taping		
	Apr				Final report on study of pilot tape by RCL
	May				
	Jun		Start of Post-Production		

Figure 2 (cont.): TIME LINE OF PRODUCTION

		Fundraising	Production	Outreach	Research
1990	Jul				
	Aug		Final Delivery to PBS	Release of FUTURES at FirstView '90	
	Sep				
	Oct			Screenings for students and teachers	
	Nov				First reports of student and teacher responses to the pilot
	Dec				
1991	Jan	Full funding achieved			RCL begins study of response to series
	Feb				
	Mar			FUTURES workshops begin	
	Apr				
	May				
	Jun				RCL Study of initial response completed
	Jul				
	Aug				
	Sep				Start of semester-long in-class study by RCL
	Oct				
	Nov				Summary report of all in-house surveys
	Dec				
1992	Jan				
	Feb				Completion of in-class study.
	Mar				
	Apr				
	May				
	Jun				Receipt of final research results.
	Jul				

project. (Figure 3, Appendix II)

The notices in newsletters that have frequently followed these endorsements and letters of recommendation have greatly facilitated outreach of the FUTURES series.

While it is not unusual to obtain such endorsement letters, we did not stop after our initial efforts. Rather, after obtaining a few endorsements we continued to build a wide array of supporting letters from different groups, amounting to over 50 endorsements and letters of recommendation. (Appendix III) Building this written support for the series was continued as an ongoing program, with several groups writing new letters of support on the release of later programs.

Through these initial contacts we found out about meetings and other potential screening opportunities from which broad-based feedback to the series could be gathered. These events provided opportunities to survey the responses of both students and teachers to the pilot episode. Such surveys were vital both for internal quality control and for verification to potential funders that this video series was an innovative and needed project.

Research: Survey results from over 1300 students who had viewed the pilot were compiled into a special report, used extensively in the fundraising effort. The overwhelmingly positive response of these students was extremely valuable when developing funding for the series. (see Evaluation section)

We discovered, however, that independent evaluation of the pilot was important to many funders prior to committing to support the series. The independent verification by Research Communications Ltd. that FUTURES was a very appealing series to both teachers and students[31] was an important factor in confirming full funding of the series.

Business: Following production of the pilot, we identified and contacted corporations to gain their interest in either funding or aiding the production of the series.

Through this work it became increasingly apparent that there is a willingness in the business community to support projects that will improve the quality of the American work force. American business executives are well aware of the lack of technical preparation in the graduates of our schools. Although these executives can meet the needs of their companies through hiring of foreign graduates, many of these same executives feel that they have a moral obligation to support education in the United States.

For example, ARCO and IBM, two of our major funders, were committed to initiatives to improve minority education prior to development of the FUTURES series. FUTURES was a natural extension of their own policy towards support of effective educational programs.

Involving corporate interests did facilitate funding, led to increased access by FUTURES film crews to worksite locations, provided access to experts in a variety of

FUTURES OUTREACH

	Members and/or Affiliates	Magazines Periodical Newsletter	Special Mailings	For more info phone number	Workshop Conference Seminar	Chapter Screening
National Education Association (NEA)	2,000,000	●	●		●	
National Council of Teachers of Mathematics (NCTM)	77,000	●	●		●	●
The College Board/ Advanced Placement Program	9,780 Schools		●	●	●	●
American Federation of Teachers (AFT)	700,000	●				
National Association of Secondary School Principals (NASSP)	40,000	●			●	
American Association of School Administrators (AASA)	18,000	●				
National Parent Teachers Association (PTA)	6,600,000	●			●	
National School Board Association (NSBA)	15,000	●				
Linkages Project/Hispanic Outreach, American Association for Advancements in Science (AAAS)	—		●	●	●	●
Mathematics, Engineering, Science Achievement (MESA)– California	15,000		●	●	●	●
National Science Teachers Association (NSTA)	60,000	●	●		●	●
American Association of Engineering Societies (AAES)	750,000	●	●			
National Society of Professional Engineers (NSPE)	70,000		●	●		●
Society of Automotive Engineers (SAE)	55,000	●		●	●	
American Society for Engineering Education (ASEE)	10,000	●			●	●
National Council for Minorities in Engineering (NACME)	10,000	●	●	●	●	
MATHCOUNTS (National)	546,426	●	●	●	●	●
MATHCOUNTS (California Chapter)	7,800	●	●	●		●
Society of Hispanic Professional Engineers (SHPE)	6,000	●		●		●
US Black Engineering	20,000	●		●	●	●
Optical Society of America (OSA)	20,000	●		●		●
League of United Latin American Citizens (LULAC)	115,00	●				●
SER Jobs for Progress	—				●	●
ASPIRA	15,000	●			●	●
National Council of La Raza (NCLR)	5,000	●				●
American Library Association (ALA)	50,065	●	●		●	
ALA Affiliated Libraries & Universities	2,925					
United States Library of Congress	—					●
American School Counseling Association (ASCA)	12,400	●				
Society of Women Engineers (SWE)	15,500	●			●	●
American Association for Counseling & Development (AACD)	57,000				●	●
American Electronics Association	—					
US Department of Energy (National Labs)	127,000	●	●		●	●
Junior Engineering Technical Society (JETS)	35,000	●	●	●		●
California Media & Library Educators Association CMLEA)	16,000	●	●	●	●	
American Indian Science & Engineering Society (AISES)	50,000	●	●		●	
National Association of Minority Engineering Program Administrators (NAMEPA)	—	●	●		●	●
Los Angeles Education Partnership (LAEP)	500	●	●	●	●	●
Achievement Council	800	●	●	●	●	●
California Science Project	100				●	●
California Association for Counseling & Development (CACD)	4,000	●	●	●	●	●
Houston Hispanic Forum	10,000				●	●
The Effective Schools Institute	1,000	●	●	●	●	●
National Council of Supervisors of Mathematics (NCSM)	—	●		●	●	●
Mathematics Association of America (MAA)	37,000				●	
US Patent & Trademark Office/Project XL	6,500	●		●	●	●
Public Library Association (PLA)	7,000	●	●	●	●	
Cooperating Hampton Roads Organization for Minorities in Engineering (CHROME)	1,000	●		●	●	●
Center for Enriched Studies - Los Angeles	1,450	●		●		
Smithsonian Institute,Office of Elementary and Secondary Education	—					

Figure 3. FUTURES Outreach: This grid shows a sampling of the organizations who have supported FUTURES, including the types of support they have given to the program.

technical fields, and resulted in new distribution options through professional organizations, most notably the engineering societies.

By August of 1989, ARCO had committed itself as the prime funder of the full series. Despite the fact that the remaining funding was not yet committed, production began in earnest once this backing was received.

Summary: We devoted considerable resources to this fundraising effort. As a result, we developed working relationships with individuals from several disciplines. Many of these individuals assisted us in the completion of a high-quality product that was truly useful in the classroom.

As production continued, these initial contacts proved invaluable in locating individuals and sites for filming, in setting up surveys and formal evaluations, in providing additional information on the needs of both teachers and businesses and in providing references and obtaining support for the full funding of the series.

During this stage we identified several educators, mathematicians and business leaders who were especially supportive of the series concept and whose own interests and expertise made it evident that they could contribute substantially to the development of the series. Several of these individuals agreed to become members of the FUTURES Advisory Board.

The initial positive response was very rewarding. It confirmed that this project was on track and was meeting a real need of teachers. Both informal and formal research confirmed that the pilot tape was interesting and effective.

Pre-Production:

As soon as initial funds were raised, we moved into production of the first season of FUTURES.

Potential topics for the first season were chosen by:

* Review of the literature on employment opportunities for technical fields, both for application of math principles and for numbers of job opportunities. (Figure 4)

* Selection of some fields which are not normally considered to involve math (i.e. Fashion), and

* Surveys of math specialists.

We initially planned to produce 24 episodes in the first season. However, we

DROPPING MATH?
Say Good-Bye to 82 Jobs

LEGEND: a & b = 4 years of math required
c = 4 years of math recommended
d = 2 years of math required
e = 2 years of math recommended

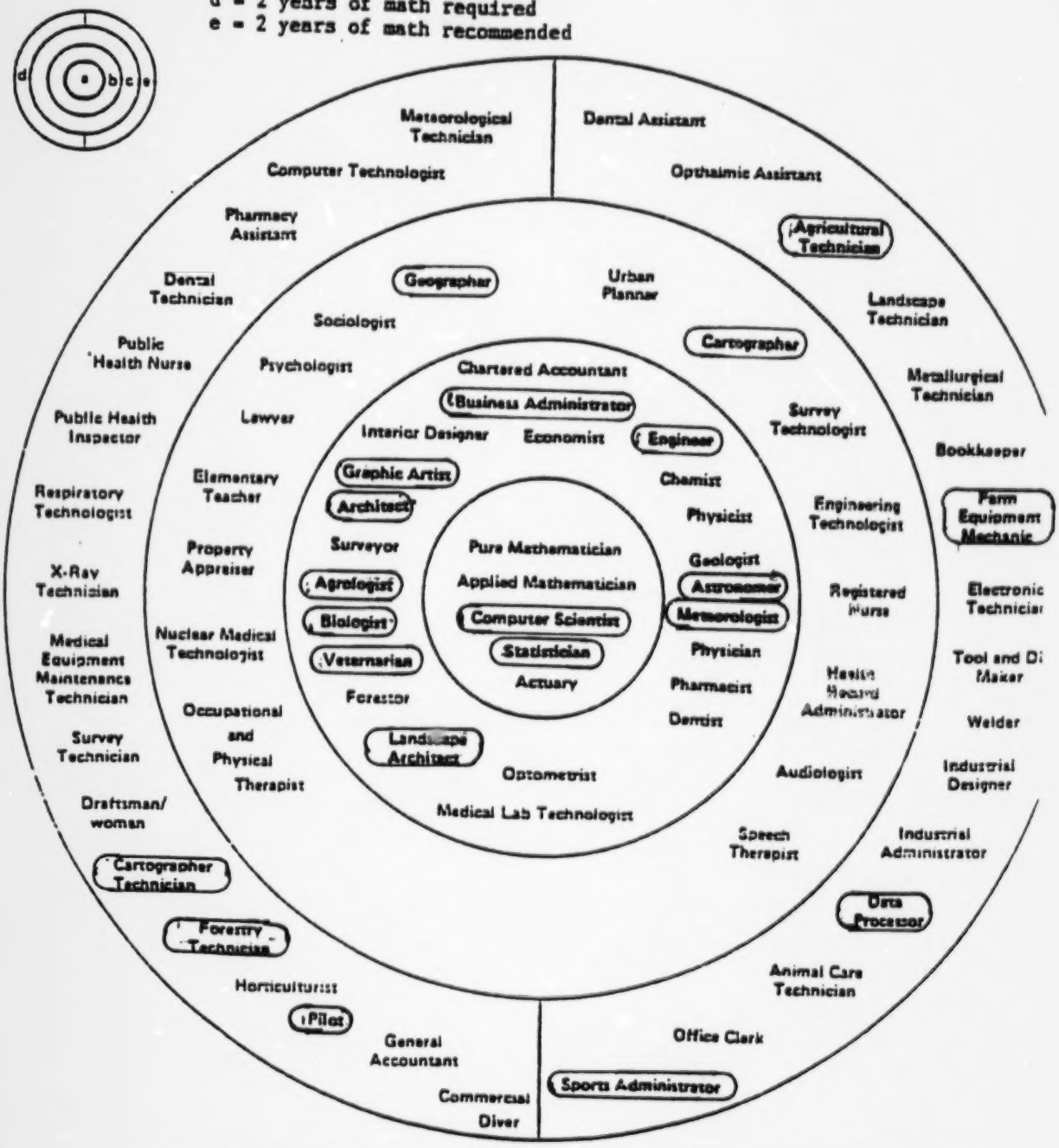

Figure 4. Careers Involving Mathematics: This figure displays the number of years of math training required for several careers. The careers in this figure which were researched during FUTURES pre-production are circled. Reprinted by permission from the Mathematics Department, Toronto Board of Education.

quickly determined that 12 episodes was a more realistic number given the extensive research and production time that would be required for each of the diverse fields being considered.

We thoroughly researched the potential for each of 20 fields chosen from this initial work as a topic for a FUTURES episode. To facilitate this research, we developed an in-depth description of items that each researcher must discover for the full report.

Our philosophy throughout production has been to devote extensive resources towards informing appropriate groups of both the purpose and the needs of our production. We made sure that this series was not created in a vacuum.

Professionals: Several of the organizations used in the full series, and the engineers and professionals interviewed for it, were contacted as a direct result of the initial outreach effort.

Entertainment Industry: We worked specifically towards involving the entertainment industry in this project. This resulted in heightened interest in appearing on the series and contributions in other ways as well.

On-Site Research: Research into each field involved on-site trips to locations throughout the nation to discover innovations in the field and to identify potential interview subjects. We paid particular attention to choosing interviewees who would appeal to students.

Role Models: One of the key goals of this series is to provide role models that minority students can relate to. Therefore, we actively searched for minorities to appear in this series. We devoted considerable financial resources to this search by spending extra research time, moving film dates, and adding film locations. This ensured that the final product did include many minorities, carefully chosen for their ability to relay their enthusiasm for their work along with the fact that their fields offer numerous opportunities for well-trained individuals.

From this research we arrived at 20 potential fields with over 90 different math and engineering applications, each with on-site experts. We narrowed this down to the 11 additional episodes we intended to film. Each topic chosen had a large number of potential jobs, was expanding and had a good match of professional interviews, potential footage and classroom guests.

In addition, for each topic chosen, we had identified companies who were willing to help us to create this series by opening their facilities to the film crew and allowing us to interview the experts they employed. This spirit of cooperation in working towards educational reform was intensely rewarding for the production team.

One tool that was vital throughout production of this series was our electronic mail

system. This tool allowed all of the executives, who were on a computer network, to keep one another informed of new leads, hot deadlines, new items that must be handled, etc. and did so rapidly and with minimal interruption of one another's work. Thus, the executives on this production were able to operate much more ably as a coordinated team. This was vital given the intense level of production required from each of these individuals throughout this period.

Production:

The executive producer developed a concept statement for each of the episodes to be produced. This statement began with a "focus" for the show and listed the locations, key personnel to be interviewed and stock footage available for the production. This was the internal working guideline for the series and formed the basis for the production focus. For example, for meteorology the focus statement begins:

> "This episode emphasizes F O R C E! We want to capture visually and through interviews the enormous force of winds, rain, lightning, etc. And the consequences of that force on lives, property and transportation and in ways people do not always realize such as in commerce.
>
> "While we're not doing a show on disasters, we do want to show that all sorts of people and fields depend utterly on our being able to predict these forces."

For Environmental Science and Technology:

> "Kids are already sold on the environmental issues so let's not preach to the choir.
>
> "We should approach the show with the attitude that they ARE environmentally conscious, they want to recycle, etc. That being a given, we can get right into our message:
>
> "Kids: Doing your individual part is great (recycling, environmentally conscious consumer, etc.). But if you want to do more than that, if you want to do more than just carry a protest sign, learn numbers. The field involves calculations, projections, chemistry, biology, engineering, geology. You can affect many future generations..."

And for Product Design:

> "We want to focus mainly on consumer and household products that are really familiar to our audience but that they may take for granted. Phones, hairbrushes, radios, stereos, pens, televisions, notebooks, tennis shoes, sun glasses, toothbrushes, soda machines, hair dryers, watches, toasters, etc.
>
> "These products didn't just wind up there. Someone created them, made them look

that way, designed them to appeal to people, made them look modern or even outdated, space-age, masculine or feminine, etc.

"To do this one must know numbers, proportions, measurements, thinking in quantities, some physics and chemistry (material strength and content) and geometry."

Using these statements plus detailed notes as the focus, full production of the series proceeded. Production again followed the guidelines set for the pilot episode.

During this production phase we were careful to implement the improvements suggested in evaluations of our pilot tape. Thus the full series does include a good mix of minority and white professionals, has a large number of female professionals, and includes some shows targeted specifically towards the female audience.

We maintained our focus on motivation rather than education. Several mathematicians suggested that we include more mathematics principles in this series. We did not heed these suggestions. The purpose of the program is to motivate. As teachers continued to tell us, they feel competent to teach math. What they need is material that will motivate their students to learn.

A keynote that may be overlooked in all of these discussions is the attention throughout production on creating ART. This, along with other aspects of professionalism in the video technique, is crucial to the success of FUTURES. FUTURES is designed to communicate to kids and teachers alike. Without focusing on the ability of this video to communicate at the aesthetic level, without professional film and video makers to achieve the product desired, this series would not have succeeded. With these features, FUTURES has achieved a very positive impact.

Distribution:

During research, we explored the distribution options for the series and the restrictions and benefits of each. We eventually chose PBS Elementary and Secondary School Service (PBS/ESS) and PBS Video as the best distribution option for FUTURES.

Even prior to finalizing our distribution agreement with them, PBS/ESS and PBS Video sponsored FUTURES in the 1989 FirstView conference, the national conference for educational video products. This screening demonstrated very strong support from the Instructional television (ITV) community (see Evaluation section).

Discussions with PBS/ESS and PBS Video occurred prior to final editing of the series. A vital piece of information we learned during this period was the necessity for the development of a teacher's guide to accompany the series. Although we had initially planned to provide posters to match each of the series' episodes, we discovered that distri-

bution of the series would be seriously limited without an accompanying teacher's guide. Therefore, we decided to produce a teacher's guide that continued the application-oriented foundation of the series.

Development of this teacher's guide was greatly facilitated by our outreach effort. Outreach had continued to create and expand upon the active network of individuals interested in the FUTURES series. The large number of business and research contacts we had developed through outreach were invaluable in providing professionals who acted as technical advisors for each episode of the FUTURES program.

We evaluated other guides in the field and surveyed teachers regarding which aspects they used. We determined that the focus of our guide was to challenge the student with applications of mathematics and to provide the teacher with tools to bring real uses of math home to the student.

To produce the teacher's guide for FUTURES, we started with the research reports prepared during pre-production. We then contacted professionals in each field who had remained active due to our outreach effort. Their contributions ensured that the guide included problems that were realistic for their fields. The contributions of these professionals allowed us to create an interesting and accurate guide in a timely fashion.

The full series was completed in June of 1990 and delivered to PBS for distribution. As described below, we continue to support this series by active outreach and evaluation.

EVALUATION

A very important aspect of the FUTURES success story is the ongoing interplay between outreach, research and production. This has occurred throughout the development of the series, thus ensuring that the product is in alignment with what teachers need in their classrooms and that it does have the desired results.

The primary purpose of FUTURES is to motivate students to learn math. Secondarily, it is to entertain and educate other non-student audiences. To succeed, this program must appeal to students, teachers and other adults. Our evaluation process has focused on both viewer response (interest) and long-term efficacy (performance/achievement) among students.

Pre-Production Research:

Prior to production of the series we extensively studied the field and designed a series concept that addressed a key concern of business, teachers and students.

The concept for the series was reviewed by teachers, curriculum development ex-

perts, business leaders and film producers. The result of these inquiries was a clarified design that was appealing to educators and underwriters alike.

An informal research initiative was undertaken to evaluate what teachers did need, what types of programs students watch on TV, whose opinion they listened to and which celebrities they would like to watch.

We observed classrooms directly and surveyed teachers thoroughly to discover exactly what they wanted from a video series. We found that short (15-minute) programs that could interest students in the subject were needed. A program which could be used to orient the class period by providing a focal point or a point of departure for a particular math topic was particularly desirable.

During development of the FUTURES series, we repeatedly surveyed both students and teachers to ensure that our video product was achieving the desired results. Information from these surveys was used extensively in the series' development.

Formative Evaluation:

1. The pilot program (featuring mathematics in automotive design) was completed in February, 1989. This 18-minute tape was informally reviewed by over 600 individuals and groups. These reviewers included students, teachers, educational administrators, college professors, mathematicians, engineers, parents and television and film professionals. The pilot tape was well received by each of these audiences. Key points for improvement were:

(A) ensuring that the series would appeal to females. (This concern was prompted by the subject of the pilot tape as the automotive field is dominated by white males.) and

(B) including more minority and female role models. These critiques were addressed and remedied in the series as a whole.

2. A survey of 91 public television programming executives was conducted in August, 1989 at the annual "FirstView" meeting. This is educational television's annual meeting to review programming that will be made available in the coming year. Over 90% of the survey respondents had a "high interest in the series." The preferred format for this series was about 26 episodes, each 15 minutes in length. Other valuable information was gleaned to help tailor the programs for actual use by educators.

3. Student responses to the pilot were surveyed at 12 schools in eight states in November, 1989. (Appendix IV) This pilot program held the students' interest very well. Mr. Escalante proved to be a well-liked host, familiar to over 60% of the students. Student comments on the video were used when editing the original pilot to its final 15-minute version. Their career preferences were used in planning the balance of the series.

4. An independent research firm (Dr. Valerie Crane's "Research Communications, Ltd." of Boston) was hired in late 1989 to further study and analyze both student and teacher response to the pilot tape and the overall series concept. Students' current attitudes towards math and knowledge of how it is used in careers were assessed. Teachers' use of video in the classroom and interest in motivational programming were studied.

A strong interest in the series by both students and teachers was confirmed by this study. Both expressed interest in viewing additional FUTURES programs at levels well above the target range for a successful program. The specific requests by teachers for particular components in a companion teacher's guide provided much of the detailed information used in developing the actual guide for the series.

Among the teachers' comments as to what they needed in the classroom was this most surprising finding: Ninety percent of the teachers felt that they are competent and comfortable teaching math. However, 66% stated that what they really needed was something to help them interest kids in the subject. This report validated our original plan for the series and has been confirmed in later showings and seminars.

5. PBS/ESS showcased FUTURES in August, 1990 at their "FirstView, '90" event and the reception was positive. Orders for the series were extremely brisk following this official release of the show.

Follow-up Analysis:

Informal Research: As the series went into full distribution, we hired a Staff Director of Teacher Support whose job was to ensure that teachers had the shows available to them and that they knew how to utilize them for the best result. She provided supplementary materials and in-services to support these teachers and other community members who might be using the series.

During this period the Director of Teacher Support had an ongoing program to survey both teachers and students to monitor their initial responses to the shows and the accompanying print materials. Results of these surveys were compiled and reports sent periodically to our key supporters to both maintain interest and generate further support. (Appendices V, VI)

Both student and teacher response to the FUTURES series was overwhelmingly positive. Key findings included:

* Over 56% of students rated the episodes as Excellent, with an additional 38% rating them as Good. Less than 0.3% rated them as Poor. (Figure 5)

* On average 76% of teachers rated the episodes as Excellent with an additional 22% rating them as Good. (Figure 6)

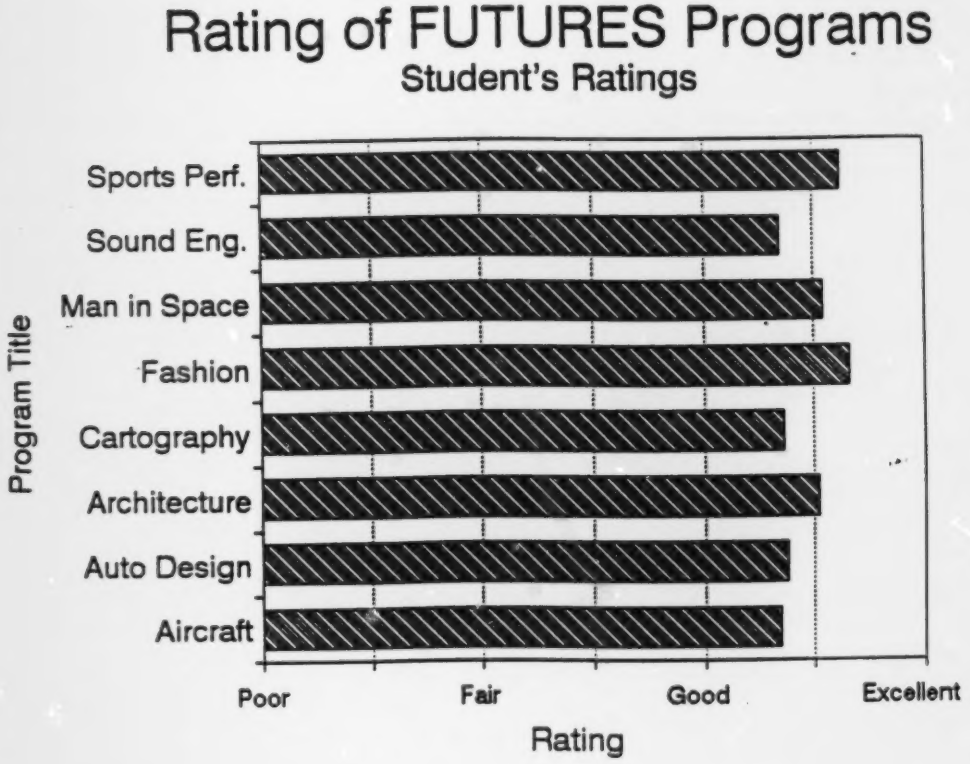

Figure 5. Student Ratings of FUTURES Episodes: Ratings by students of FUTURES programs are shown in this figure. Students rated FUTURES as either Excellent, Good, Fair or Poor following screenings of various episodes. These ratings were assigned numerical values from 4 to 1. This graph displays the average rating by students for the eight FUTURES episodes surveyed in this manner.

- Both students and teachers found the FUTURES programs visually exciting and informative.
- 96% of students would recommend FUTURES to their friends. 96% would like to see additional episodes themselves.
- 64% of teachers rated the teacher's guide as Excellent with an additional 34% rating it as Good.

Key points for improvement were: to identify the math concept being focused upon more specifically, to make it easier to find appropriate problems in the guide and to ensure

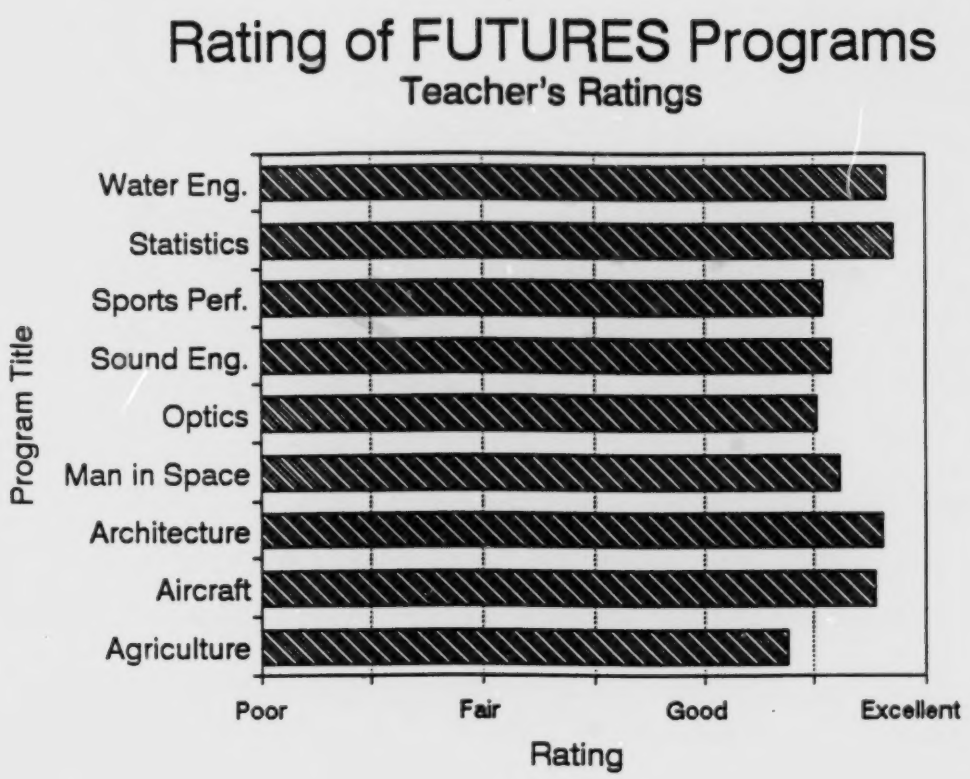

Figure 6. Teacher Ratings of FUTURES Episodes: Ratings by teachers of FUTURES programs are shown in this figure. As above, teachers rated FUTURES as either Excellent, Good, Fair or Poor following screenings at teacher workshops. This graph displays the average rating by teachers for the nine FUTURES episodes surveyed in this manner.

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that a good mix of minorities and women appeared in each episode.

These surveys were used in our research and development of Season II to improve the shows, capture greater student interest, ensure the show components were balanced, the print companion materials answered all the questions which arose and to develop other means to make the shows more useful to teachers.

Formal Evaluation: Our long-term evaluation plan was formulated in collaboration with Dr. Valerie Crane at Research Communications, Ltd. Several formal studies have already been undertaken and this research program is continuing into the second season.

A study comprised of two parts began in January, 1991 with the first part concluding

in June, 1991. The second, larger, component of this research started in September, 1991 and concluded in April, 1992.

In addition to assessing the response to FUTURES, these studies were designed to glean a more accurate view of the attitudes and opinions of students and teachers from a national sample. Regarding FUTURES, the specific research questions addressed included:

1. Does this series result in an increased interest in math for 7th, 8th, and 9th graders?

2. Does this series help teachers to present a more interesting mathematics program?

3. Do students better understand the relationship of math to future jobs after viewing this video series?

4. Do students actually perform better in math following exposure to the "FUTURES" video series?

5. How can this series be improved to better accomplish each of the above?

6. Are any of the above responses related to sex, age, race or ethnic background, or socioeconomic status?

Initial Response to the Series:

The first study looked at initial responses to the program by both teachers and students. Teachers who had used FUTURES in their own math classes participated in a 2-hour study session while students participated in a one-house session.

Each group filled in the initial section of a questionnaire, watched the "Architecture and Structural Engineering" episode of FUTURES and followed this up with both questionnaire and interview.

As expected, students were extremely positive about the roller coaster scenes from this video but less interested in the engineering school and engineering company. Notably, however, the portion of students interested in becoming engineers went from 30% before to 45% after watching this episode. Many students stated that the program gave them new ideas for careers and pointed out why they will need math in the future.

These teachers were preselected as FUTURES users. Not surprisingly, the two areas they would like to see addressed by math videos are knowledge about the use of math in everyday life and motivation to learn math, specific goals of the FUTURES program.

The majority of teachers had noticed a change in their students' attitudes towards math since they had been using FUTURES, with 75% commenting on positive attitude

changes in students following the FUTURES program.

88% of the teachers surveyed said that FUTURES is better than other available educational programs. 74% stated that they would recommend the series to other teachers.

Specific areas for improvement included enhancements to the teacher's guide so as to provide more range of difficulty in the problems, the addition of handouts for students and the inclusion of more blue-collar jobs in the videos themselves.

Long Term In-Class Evaluation:

The second stage of evaluation was aimed at determining what long term effects FUTURES had on student attitudes. Half of the students in this study watched all 12 episodes of FUTURES in their math classes while half watched none. Questionnaires and individual interviews were conducted before, immediately after the last showing and at follow up time.

FUTURES did have significant positive effects on student attitudes towards math, science and careers. FUTURES was effective in mitigating the disturbing tendency for students to become less interested in math and science as the school year progressed. (Figure 7; Appendix VII)

One surprising finding was that intensive viewing of the series appears to result in a more long-lasting improvement in student attitudes than viewing the series over a longer period. This finding could directly impact the recommended use of motivational television.

Conclusions:

Our informal research program has been invaluable in keeping us informed of the needs of teachers and students. Fully utilizing this information has led to a product that formal research confirms to be a valuable addition to the classroom.

There are several areas for future work. The items teachers most want include:

* Video support that specifically links their current curriculum to the careers and opportunities presented in FUTURES. Other than lack of classroom time, this is the most often-cited reason for not using FUTURES more.

* The ability to quickly and easily locate video that matches either their curriculum needs or the interests of their students.

* Support materials, such as handouts and problems, that match both the video and the math skills of their classes so as to better fit into the curriculum.

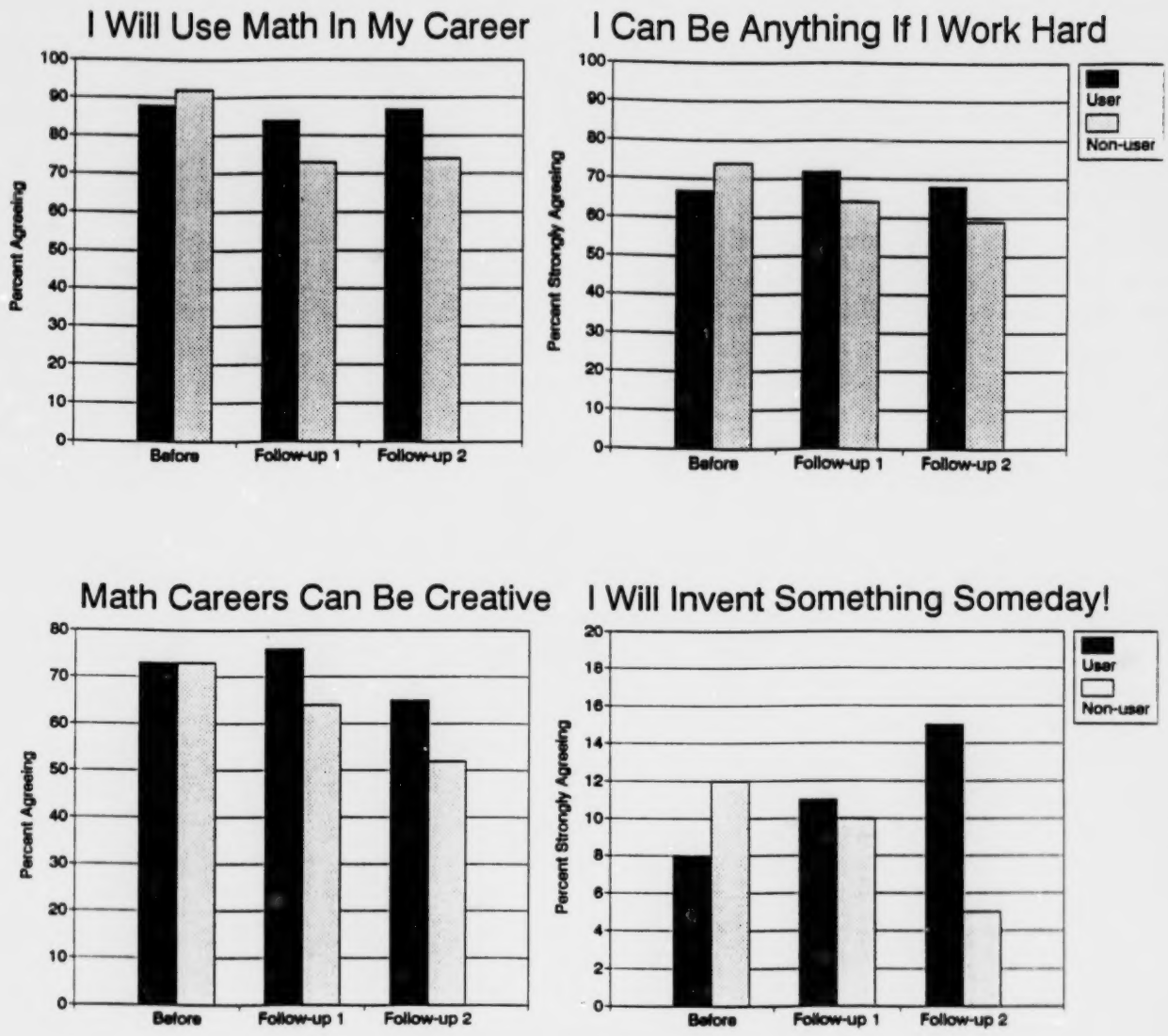

Figure 7. Effects of FUTURES on Student Attitudes Towards Math, Science and Careers: Students were asked whether their level of agreement with several statements regarding math, science and careers. Half of the students saw FUTURES as part of their math classes (users) while half served as controls (non-users). Students were surveyed prior to viewing FUTURES (Before), immediately after all 12 episodes of FUTURES had been viewed (Follow-up 1), and at a follow up time over a month later (Follow-up 2). For more detail, see Appendix VIII.

* More examples of the methods used by Jaime Escalante to motivate his students.

* More information on the means by which Jaime Escalante has effected his impressive teaching results.

Each of these is being addressed in upcoming products from FASE Productions.

OUTREACH

The most critical element in the success of the FUTURES series is ensuring that it reaches the audiences for whom it is intended and delivers what is needed. While wide distribution is essential to this goal, educational television producers sometimes begin work on the distribution and outreach functions only after production of the property has been concluded. In addition, organizations often relegate this function to a separate unit which is disconnected from the production itself.

We determined that it was vital to begin distribution planning and outreach simultaneous with, rather than after, the production of the series and to focus in this outreach effort on how the series could best meet the needs of the education community. Our interest was not just in selling the series but in learning more about teacher's needs and how the series could help them to provide a better education. This grassroots outreach approach has provided us with the opportunity to obtain an enormous volume of direct feedback to the series. This has greatly improved the FUTURES product while increasing its dissemination as well.

By initiating our outreach effort early and directly tying it to product development, we have achieved a utilization-driven final product from concept creation and design, to pilot evaluation, script writing, editing and packaging and, finally, to the delivery of the product. These same principles are continuing during the production of our subsequent programs.

Key Actions:

Phone Calls: One of the differences between our group and other production companies has been the way we encourage individuals to directly contact the production company. We have received thousands of calls and we do not shunt these over to a distributor. Rather, we have built the capability to respond. This has allowed us to acquire a real idea of the impact of the FUTURES program while providing direct support for the end user.

Mailings: From the start, we took great care in the creation of promotional materials on the FUTURES series. These materials included brochures that relayed the excitement of the series, color photos from the set and quality duplications of the tapes.

Meetings: We continue to attend meetings of teacher's organizations and mathematics societies. We work actively to inform teachers of the FUTURES program at these meetings and acquire their feedback on how this program might best fit into their classrooms.

Workshops: We have provided workshops on the FUTURES program at both teacher's conferences and at independent, full-day events.

These workshops have introduced teachers to the FUTURES video and provided us with an opportunity to learn more of teachers' needs. Surveys from these workshops have provided us with more detailed responses to the program than are possible at meetings. At the same time, the workshop introduces teachers to the program and informs them how to acquire it at no charge through the ITV network in their area.

Updates: We actively maintain communication with the individuals who have contacted us regarding the FUTURES program. We send these individuals notices of recent events, of awards, of study results and of upcoming products. We encourage them to reply and to tell of us of methods they have found to motivate their students.

At this time, we have over 7,000 teachers, engineers and businesses on our mailing list for this production. We keep this network informed and work towards building a large group of individuals who are changing conditions in the classroom.

Summary:

Whereas most video production companies contract with a distributor to handle such outreach efforts, relying on the distributor's catalog and promotional material, we have devoted considerable resources to directly contacting individuals and organizations while at the same time building a strong working relationship with our distributor, PBS/ESS and PBS Video.

This direct outreach has allowed us to better serve the educational community. Based on informal and formal surveys, we have upgraded our products to better meet the real needs of teachers and students.

Pre-release sales of FUTURES by PBS underscored the demand that exists for the series and the success of our early outreach efforts. Twenty-two states bought or licensed Season I episodes prior to the mid-August, 1990 release date, representing a combined potential viewership of over five million students.

By the conclusion of its first season, FUTURES was being aired on PBS Elementary and Secondary Service in 44 states over 226 stations and was available to an estimated 15 million junior high school and high school students. PBS video had sold over 15,800 FUTURES tapes.

FUTURES has been utilized by more states, faster, than any Instructional Television (ITV) series ever offered by PBS.

NEW DEVELOPMENTS

FUTURES has been remarkably successful in its first season.

The extent of the effect that FUTURES is having is summed up in recent remarks of Joan Katz, Director of PBS Elementary/Secondary Service: "The enthusiasm for FUTURES has been overwhelming. The response by stations, state departments of education and others who have licensed the series for school television use is unprecedented. FUTURES sets a new standard for using TV to help all students get turned on to math and to connect the classroom study of math to the real world, to exciting jobs and careers -- their 'futures'."

In its first year of release, FUTURES has already achieved a potential viewership of 15 million students. Student and teacher surveys as well as formal evaluations document the fact that this series is not only popular but is also effecting positive change.

The impact of this series is underscored by the large volume of enthusiastic letters and calls FASE has received regarding the program. This individual support is flanked by endorsements from major educational and professional organizations, many of which actively promote FUTURES in their own outreach efforts.

The success of this series has opened the door to both improve and expand upon this program. An important outcome of both the formal and informal evaluations of FUTURES has been an in-depth analysis of ways in which the series concept can be more broadly utilized. Major findings are:

1. Teachers would like a new product that encourages parents to support their children's educational goals.

This request led to the development of the "Math...Who Needs It?!" special (also produced by FASE Productions), which aired on PBS last fall. "Math...Who Needs It?!" captured twice the average audience for PBS programming. It received extensive national publicity and provoked a huge outpouring of enthusiastic calls and letters from parents and teachers.

2. Teachers could better use the series if a resource was available that explicitly linked the content of FUTURES to their curriculum.

In the second season of FUTURES, the math concepts presented in each episode have been simplified further and the teacher's guide is more exactly designed to link FUTURES to the classroom and to meet other requests.

3. For years, teachers have requested a better insight into the teaching methods of Jaime Escalante. This desire was repeated by teachers during evaluations of FUTURES.

This request will be answered in upcoming products from FASE Productions.

CONCLUSION

Math education in America is in a state of crisis. It is not, however, universally declining. There are many excellent examples of effective educational environments in which students are learning and applying math.

FUTURES has expanded on one of the most widely known of these effective programs -- the Jaime Escalante program at Garfield high school -- to provide a motivational tool that can be used in the classroom.

FUTURES motivates students -- it changes their attitudes towards math so that they open their eyes to the subject. FUTURES addresses one of the first steps towards improving education in the U.S. It encourages students to understand and become involved in the application of mathematics.

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Appendix I

PUBLIC RECOGNITION OF JAIME ESCALANTE

Jaime Escalante holds a unique position in the public eye. Few teachers have ever had such a widespread impingement into society's consciousness. This is based on his own accomplishments as a teacher, especially in the area of motivation. Milestones in the progress of this name recognition include:

1) Stand and Deliver (1988) was both a critical and educational success. Teachers, students, families, business and community leaders became involved with special screenings and school "assignments" to watch it as a motivational boost for education. This project was honored with an Academy Award nomination for the powerful performance of Eddie Olmos in the role of Mr. Escalante. Millions of Americans have seen it in theaters or on regular television rebroadcasts. Rarely has a story of such educational substance received this level of overwhelming popular support. Many teachers have bought the videocassette version of the film. FASE often hears reports of teachers showing it in Math, Spanish, Social Science, and even English classes. A Scholastic, Inc. paperback published for students, presenting the screenplay in novel form, has sold out.

Cuts from the film formed the basis for TV spots for the Recruiting New Teachers campaign designed by The Ad Council. This campaign ran for a few years and kept "Stand & Deliver" in the public eye. The campaign was a spectacular success, generating hundreds of thousands of inquiries about the teaching profession, many from minorities.

2) Jaime Escalante: Best Teacher in America (1989; Henry Holt and Co., New York) by Jay Mathews, West Coast Bureau Chief of the *Washington Post* was a strong-selling book which achieved a status of regular use in schools of education around the country. The book met with very high acclaim from educators and critics.

3) "Mathematics and the minority student: the Escalante math program" by Jaime Escalante and Jack Dirmann[11] was published in 1990. In this article, Mr. Escalante briefly described elements that he had found most important in his teaching. Following its publication, tens of thousands of reprint requests were received from teachers and educators. This article, originally published in the Journal of Negro Education, was reprinted by both Howard University and the National Education Association to fulfill this demand.

4) "FUTURES with Jaime Escalante" Segments #1-#12 (1990) are being ordered faster than any other series in the history of ITV. The number of children in the potential viewing audience is over 15 million. The PBS videocassette distribution for the series reportedly exceeds all other series except for "Civil War" and "Eye On the Prize", both of which were major PBS prime time series.

5) FUTURES is used around the world in places such as the Defense Department's

Armed Services schools; in schools of education at the University of Arizona, Illinois, Wisconsin, and Clemson University; in Department of Energy federal research laboratories in several states; in libraries and in museums -- to give some idea of uses outside of the K-12 application.

6) Mr. Escalante has been deluged with speaking requests for the past four years. Many of these that he has obliged have had large audiences of teachers. Informal evaluations and reading of audience reactions (such as standing ovations) show a remarkably high interest in him and his teaching. He continues to receive large numbers of letters and calls, requesting his appearance at teacher enhancement seminars, workshops, and speaking engagements. At Garfield, he typically received more than 50 phone calls, letters, and visitors per week.

7) FUTURES has been the subject of numerous regional workshops. Over 600 teachers have attended these workshops and been surveyed following the presentation (Appendix VI). The single most requested item in these surveys is to have Mr. Escalante show teachers what he does with a full lesson in a typical class.

8) "Math...Who Needs It?!" (1991) was aired throughout the nation during the first week of September, 1991 as part of PBS's Back-to-School offering. It garnered far more print publicity than any PBS show throughout the entire month, including the PBS Fall Preview week. Well over 1,000 letters have been received from parents and teachers, all of them positive. An equal number of calls were received on PBS's 800 lines and at FASE. It was aired again during American Education Week and the U.S. Postal Service has posted a full size "Math...Who Needs It?!" poster in the lobby of each Post Office in the country. 40,000 additional posters were sent to high schools and junior high schools around the country. Teachers are using tapes of this show for parents' conferences, in their classrooms, and to excite other teachers.

9) FUTURES shows #13-#24 will air in September of 1992. It is likely that the series will enjoy an even larger teacher/student audience than shows #1-#12 did based on the publicity that will accompany the release of these entirely new episodes.

10) Mr. Escalante is publishing a consumer book for parents entitled "Math...Who Needs It?!" on how to help their children in math, slated for release in 1992. This publication will be linked to FUTURES through still photography and other career-oriented information.

Appendix II

OUTREACH NETWORK

One of the most successful aspects of the FUTURES project has been the pattern that FASE developed for distribution of the FUTURES series. Our distribution pattern is as follows:

Broadcasting and Distribution Channels:

1. We evaluated several broadcasting options and chose PBS Elementary and Secondary Service because it reaches a potential total viewership of 29 million students (PBS briefing sheet) through tens of thousands of schools and is the broadest distribution outlet in the instructional television field.

PBS/ESS touted Season I of the series as their main entry into the classroom in 1990. Press conferences, promotional mailings to member stations, showcasing at "First-View", and many other promotional pushes occurred and have continued with the release of the second season.

2. We also contracted with PBS Video to produce and market videocassette tapes of the series simultaneously with the broadcast to schools. This distribution will cross over to schools, colleges, libraries, and pick up marketing help through engineering and professional societies, community groups, parents, and concerned businesses.

Flanking Distribution:

Success in reaching a wide audience of children was increased by not relying on any single outlet, but instead executing a multi-faceted distribution plan which flanked both the in-classroom and PBS home broadcasts. Due to space limitations we cannot detail all of the outlets we have utilized. This is a sampling of our distribution collaborations.

For each of these organizations, we developed contacts by introducing them to the series and working out a means by which they could directly support the concepts behind the series. The FUTURES series was endorsed by many of these organizations, was featured at meetings, was discussed in newsletters and was used by members in their own outreach efforts into the classroom.

The Water Engineering episode, for example, became a standard component of talks given by California Dept of Water and Power personnel to students throughout the state.

Participating Companies: During the first season of FUTURES, the U.S. Department of Energy, ARCO, IBM, and Ronald McDonalds Children's Charities each contributed to a significant coordinated print and television publicity campaign. The U.S. Department of Education, the National Science Foundation and the U.S. Department of Labor added their resources in the second season.

Over 100 companies and institutions provided footage and/or allowed our cameras to interview their staff in their facilities. Many of these organizations promoted the series through their technical staff who volunteer in area schools.

Educational and Teacher's Organizations: We directly contacted and enlisted support for the series from Chiefs of State School Organizations as well as others in the State Departments who are responsible for technology.

We contacted universities, state colleges and teachers colleges to gain their support and to spread information about FUTURES to pre-service classes. Some of these institutions implemented programs that utilize FUTURES as part of their pre-service training.

Promotional material was sent directly to school boards, school superintendents, school principals, junior and senior high schools and their respective organizations.

Math Organizations: The Math Association of America, the National Council for Teachers of Mathematics, the National Council of Supervisors of Mathematics and other math groups were enlisted to support this project. All have become actively supportive of FUTURES and have worked through national conferences and publications to make the series known to their memberships.

Scientific Organizations: The American Association for the Advancement of Science, the National Academy of Science, and others were supportive as well.

Engineering Organizations: We worked with The American Association of Engineering Societies, The Society of Automotive Engineering, The Junior Engineering Training Society (JETS), The National Society of Professional Engineers, and many other engineering groups to enhance the distribution and utilization of the FUTURES series. California MathCounts, sponsored by the National Society of Professional Engineers, has been particularly supportive of the series.

We attended the national conferences of many of the above groups and displayed or in some cases screened FUTURES to their memberships. In all cases, the reception has been positive. Nearly all have endorsed FUTURES. We continue to create an even broader and more active alliance around this valuable product.

Appendix III

SAMPLE LIST OF ORGANIZATIONS ENDORSING FUTURES

National Council of Teachers of Mathematics

The National PTA

Action for Children's Television

League of United Latin American Citizens

Educational Testing Service

National Education Association

National Action Council for Minorities in Engineering, Inc.

American Society for Engineering Education

American Association for the Advancements of Science

University of California, Los Angeles, Graduate School of Education

The College Board

California Society of Professional Engineers

Los Angeles Educational Partnership

United States Department of Energy

Junior Engineering Technical Society

Mathematics Engineering Science Achievement

California State University, Los Angeles

United States Department of Education

The Rockefeller Foundation

Black Engineer Magazine

The White House

O'Donnell Foundation

Hispanic Engineer Magazine

NATIONAL COUNCIL OF
Teachers of Mathematics
1906 Association Drive, Reston, Virginia 22091 ■ (703) 620-9840

2 January 1990

Mr. Robert Hoffman
Coordinating Producer
Foundation for Advancements in
Science and Education
Suite 215
4801 Wilshire Blvd.
Los Angeles, CA 90010

Dear Mr. Hoffman:

The "FUTURES" pilot video has been viewed by members of our professional staff and by our President, Shirley Frye. We were quite favorably impressed by the quality of the tape and the potential for the proposed series.

What can we do to assist you with this project? For example, we could publish an article in our newsletter, send informational material to supervisors of mathematics, and/or distribute camera ready announcements to the editors of the newsletters/journals published by our local chapters.

Sincerely,

James D. Gates
Executive Director

JDG:kf

cc: Mrs. Shirley M. Frye

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June 30, 1989

Mr. Jaime Escalante
c/o Fund For Excellence In Education
Los Angeles, California

Dear Mr. Escalante:

NEA is proud to "endorse" your excellent video: "Futures." What a wonderful motivational tool for junior and senior high students.

Math or science teachers using this video will find their students more interested in the relevance of these topics to their daily lives and interests.

Congratulations on producing such a video, which will help to demystify math and science in an entertaining and memorable way.

Sincerely,

Alicia Sandoval

Alicia Sandoval
Director of Communications

American
Association
for the Advancement of
Science

1333 H STREET, N.W., WASHINGTON, D.C. 20005
(202) 326-6620

OFFICE OF SCIENCE & TECHNOLOGY EDUCATION

March 27, 1989

Mr. Jack Dirmann
Foundation for Advancements
in Science and Education
4801 Wilshire Boulevard, Suite 215
Los Angeles, CA 90010

Dear Jack:

I just finished viewing the video "FUTURES" and wanted to give you my reactions. First of all, congratulations on your efforts to bring the message of the importance of mathematics to all kids. The video is great. It is professionally produced - crisp, lively, entertaining. Best of all, it carries the message that "ganas" is the main requirement for achieving our goals.

The concept of a classroom-based feature with Jaime and a guest captures both the enthusiasm that Escalante projects and, at the same time, provides the flavor of a prime-time talk show that is relevant to adolescents. This approach should catch and hold the audience's attention - it doesn't look like a dull TV documentary or news story. I would think that kids from 4th or 5th grade on through high school would enjoy the show.

Danny Sullivan is a great choice for a guest. The action and excitement of race car drivers, along with his youthful appearance and articulate comments about school and math make him a good role model. The lead-in from racing to design, engineering, and computer graphics - all requiring mathematics - is an excellent approach. The viewer gradually comes to realize that not only is there more to racing than meets the eye, but that there is an entire field of automotive design and engineering that requires a mathematics background.

As I mentioned on the phone, the only suggestions are to work for more student interaction with Jaime and the guest, and to add a "read more about it" segment at the end.

I hope that you are successful in launching this. I would like to use it in my work with community groups and other efforts to encourage mathematics and science for young women and minorities. I look forward to keeping in touch with you about this and other work that we are doing.

Best regards,

Gerald Kulm

DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CAMBRIDGE, MASSACHUSETTS 02139

July 18, 1989

Mr. Jack Dirmann
Foundation for Advancements in
Science and Education (FASE)
Park Mile Plaza
4801 Wilshire Boulevard
Los Angeles, CA 90010

Dear Mr. Dirmann:

Today it is widely recognized that graduates of American high schools have a standard of mathematics that is alarmingly below that of students from other industrialized and some developing countries.

It is further recognized that if this situation is not rectified, the United States will lose its world leadership in technology and innovation which is essential to its survival as a modern industrialized country.

Anyone who carefully evaluates Mr. Escalante's outstanding contributions over the past ten years will inescapably conclude that students from all walks of life can meet the highest standards in mathematics if they have the desire to do so. However, the motivation to study mathematics is currently absent in the formal and informal education of our youth. Schools, at best, offer mathematics but do not provide the motivation to study it. And the entertainment media provide no role models that would inspire students to pursue mathematics.

Having viewed your video presentation "Futures", I can say that it is the first effective work that I have encountered that addresses this most critical national problem. The video recognizes that you cannot lecture to or mandate that students study mathematics. The only way that students will acquire the desire to do this is if they conclude that it is important for them.

Starting with people and activities to which young students can easily relate and weaving in the importance of mathematics is, in my opinion, an excellent approach. You succeeded in getting your message across in the form of professionally produced entertainment.

What is needed is a whole series of such films involving different people and activities all having the same message. One or two will have only a negligible effect. Repetition is one of the most powerful tools in communication. The different situations will attract the students and the repetition of the common message will have its lasting effect upon their motivation.

Congratulations to you and to Mr. Escalante for the concept and the superb execution.

Sincerely,

Amar G. Bose
Professor, Electrical Engineering
and Computer Science

AGB/m

American Society for Engineering Education

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REPLY TO:
9714 Carriage Road
Kensington, MD 20895

March 29, 1989

Mr. Jack Dirmann
Foundations for Advancements
in Science and Education
4801 Wilshire Boulevard -- Suite 215
Los Angeles, CA 90010

Dear Jack:

Thank you for letting me preview the videotape, "Futures." It is very well done, and should generate excitment in a high school audience. In fact, I think it might be most effective when shown to students in grades 7-10.

I was delighted with the message. It was simple and to the point. You avoided the temptation to teach concepts with the tape. Rather, it is motivational in tone, telling students how important math is, and how it provides the basis for future careers -- in this case, engineering.

I showed the tape to my daughter and a friend, both of whom are in the seventh grade. They found the presentation exciting, and it held their attention, even though neither has an interest in auto mechanics or racing. Future videos on topics such as mathematics in fashion design would probably be even more appealing to them.

As we discussed on the phone, I will show the videotape to the guidance groups at one or two professional engineering societies to obtain their reactions.

Sincerely,

Lawrence P. Grayson
President, 1988-89

CALIFORNIA SOCIETY OF PROFESSIONAL ENGINEERS

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

1005 · 12th Street Suite J Sacramento, California 95814 Telephone (916) 442-1041

March 31, 1989

Mr. Steven Heard
Foundation for Advancement of Science and Education
4800 Wilshire Boulevard
Park Mile Plaza, #215
Los Angeles, California 90010

Dear Steve:

Thank you for sharing your pilot video with me. I was very impressed.

As the director of MATHCOUNTS (a math competition for 7th and 8th graders) in the State of California, this project really excites me. The program should do much to assist in our efforts to reach the junior high school level children of our country. What is special about your program is that it will reach the high school students, the parents, and the education establishment. A program like this will show American youth the very real importance of math.

As you are already aware, we are falling behind the other industrialized nations in the subjects of math and science. The National Testing Service has revealed that the majority of 7th and 8th graders surveyed do not even think that math and science are important. If this trend continues, we will find the United States ranked with the Third World nations instead of the Industrialized Nations. We have a shortage of qualified math and science educators from the junior high level on up to the college level. College engineering enrollments have been falling nationwide for several years, despite estimates of a shortfall of 400,000 bachelor's and 27,000 doctorates by the turn of the century. Your program will help to wake up the United States and return us to the role of industrial power we once held.

What I most like about the concept of your broadcast is that it will be only one which to my knoweledge is dedicated to

showing authentic life needs for studying math in real careers. Because of this and other reasons as outlined, the California MATHCOUNTS program and its sponsoring organization, the California Society of Professional Engineers, wishes to encourage and support you in your efforts.

Please feel free to contact me for any assistance. Go for it!

Sincerely,

Cliff

W. Clifford Ishii, P.E.
State Director,
MATHCOUNTS

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®

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TELEX NO. 866355

March 30, 1989

Mr. Steven Heard
Foundation for Advancements in
Science & Education
Park Mile Plaza-Suite 215
4801 Wilshire Boulevard
Los Angeles, CA 90010

Dear Steve:

Thank you for sending me the pilot presentation which you have developed for public television and for crossover distribution through in-classroom television.

Congratulations on producing what I would definitely say is the best guidance video that I have observed to date. I have had the opportunity to view quite a few videos that have been prepared by various organizations for the purpose of motivating students to study math and science and, in particular, pursue careers in engineering. Your "FUTURES" video featuring Jaime Escalante is truly exciting and I know will motivate students to include math and science subjects in their studies.

As you know, SAE has committed itself to encouraging young people to pursue math and science. SAE has been involved for quite a long period of time in assisting college engineering students by providing hands-on activities which they normally don't receive in the classroom. Mr. Escalante uses similar techniques in motivating his students.

SAE would like to become involved in the distribution of the "FUTURES" Series and, in particular, the pilot program on Automotive Engineering. SAE has approximately 60 local Sections in North America and through these local Sections and our 55,000 members, we have the opportunity to provide individuals to speak to classes on the topics of math and science and, in particular, careers in engineering. This video would be an ideal mechanism to initiate these discussions. SAE has 200 student groups on college campuses throughout North America. Over 150 of these student groups participates each year in student design competitions. These competitions include the design, fabrication, and actual racing of various types of vehicles including mini baja and formula cars. Many of these student groups also visit high school classrooms. It would be our intention to provide this tape to each of our student groups so that they may also share it in the classroom.

Again, we thank you for allowing us to review the pilot program and for considering SAE to be one of the organizations that might assist in distributing the video through our membership directly into local schools throughout North America. After I've had the opportunity to share the video with several other groups within SAE, I will be returning it to your attention. Everyone who has viewed it to date was extremely impressed with both the professionalism of the production and the message which is put forward. We wish you continued success with this program.

Yours truly,

Ray

R. A. Morris, Director
Field Relations Group

/ah

SUMMARY OF STUDENT RESPONSE TO THE "FUTURES" PRESENTATION PILOT

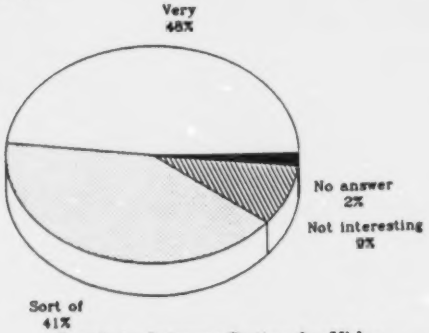
The pilot video of the "FUTURES" video project was shown to 1382 elementary, junior high and high school students at 12 schools across the United States. Students in Massachusetts, New Hampshire, Maryland, New York, South Carolina, Utah, Colorado, and Los Angeles participated in this screening. Following the presentation, students filled in a questionnaire designed to assess their response to the video. These responses can be summarized as:

Ability to Hold Interest

An important factor in any video presentation is its ability to hold the interest of the audience. The interest level and overall response of these students to the video was assessed with three questions asking for:

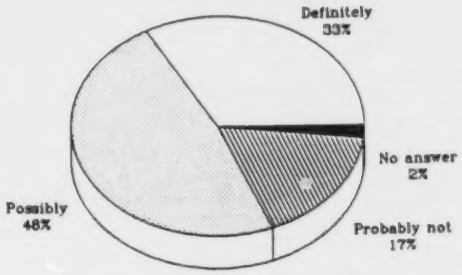
(1) interest rating,
(2) whether they would recommend the show to their friends, and
(3) whether they would be interested in watching additional shows in the series.

As shown in the Graph 1, 48% of the students found the overall show very interesting, 41% found it sort of interesting and only 9% did not consider it interesting. These responses varied considerably between schools. (This held true for all questions of the survey.) Responses also varied by age, though with no obvious pattern. Boys liked this show slightly more than the girls, as was expected since this pilot episode focuses on the auto industry.



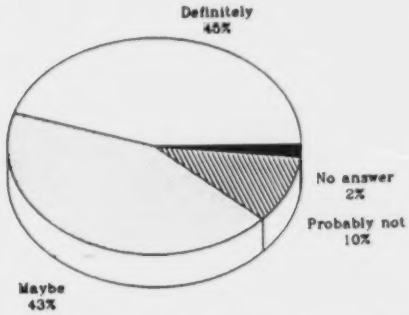
Graph 1: Interest Rating for Video

Students were also asked whether they would recommend the show to their friends. Responses to this question (Graph 2) are that 33% would definitely recommend the program, 48% would possibly do so, and 17% would probably not recommend the program. There was very little difference in recommendation rating between boys and girls, but there was a tendency for a reduced rating in the teenage students.



Graph 2: Recommendation to Friends

The third question asked whether these students would be interested in watching additional shows in this series. Their interest in this regard was very high with 45% of the students stating that they would definitely like to see more shows, with another 43% "maybe" interested and with only 10% "probably not" wanting to see further shows (Graph 3). Boys were more strongly interested than girls in seeing future shows. Students from different schools, again, varied considerably, and there was more interest in the 8 to 10-year-old students.

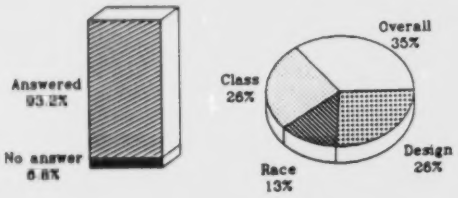


Graph 3: Interested in Watching Future Shows

Success of Show Components

The show is composed of several components. To assess the success of these components, the students were asked "What did you like BEST about the show?" and "What did you like LEAST about the show?".

In the "Best" category (Graph 4), comments on the overall structure of the show were the most abundant, with approximately 35% of the respondents making a generally favorable comment. Included in this group are 13% of the students who specifically stated that the best part of the show was its emphasis on the relevance of math to future careers and its encouragement to work towards your dreams.



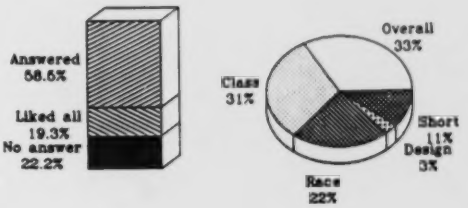
Graph 4: Best Liked Parts

When separated by components, the largest number of positive comments were attributed to the car design and to the classroom segments of the show (26% of the students each), with both of these segments far more popular than the racing segment (13%). Over half of the replies in the classroom category were from students choosing Mr. Escalante as the best part of the video.

The boys clearly favored the car design segment, the driving, and the topic in general while the girls rated the car design segment, Mr. Escalante and the message as the best parts of the show.

In the "Least" category, it is notable that only 59% of the students chose a "least-liked" item, whereas 93% of the students chose a "best-liked" item. An additional 19% replied that there was "Nothing they didn't like" about the video, with the remaining 22% not answering the question.

Some aspect of the classroom segment was chosen as the least liked by 31% of the respondents. Specifically, the noise made by the students at the start of the show was considered unrealistic by many (16%). An aspect of the racing segment was least liked by 22% of the respondents, more of these being girls. Very few students disliked the car design segment (3%). Eleven percent of the respondents requested more of particular components or stated that the least-liked aspect of the show was that it was too short.

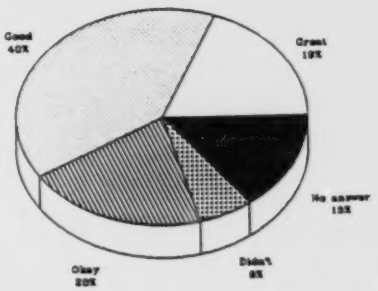


Graph 5: Least Liked Parts

Combining responses to both the "Best" and "Least" questions, it is clear that the car design segment is the most appealing portion of this presentation.

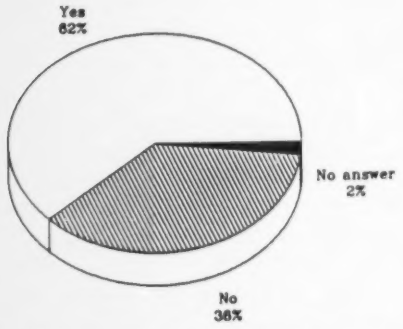
Rating of Mr. Escalante as Host of the Show

As Mr. Escalante will be the host for this series, we were very interested in assessing the response of the students to him in this role. Answers to the question "How did you like Mr. Escalante as the host of the show?" are shown in Graph 6. Student response was very positive, with 59% of the students rating Mr. Escalante as either "good" or "great".



Graph 6: Response to Mr. Escalante

Another point of some interest is whether the students were familiar with Mr. Escalante. This was assessed by the question "Were you already familiar with math teacher Jaime Escalante?", shown in Graph 7.



Graph 7: Familiarity with Mr. Escalante

Mr. Escalante did have widespread name recognition prior to the showing of this video, with approximately 60% of the students having prior familiarity with him. This response was very similar for boys and girls, but highly variable between ages and classes.

This factor does have some effect, but not a major one, on the desire of these students to watch additional programs. When the 500 students who had not previously heard of Mr. Escalante were separately tabulated, it was found that 40% of them would definitely like to see additional shows, 46% might like to see additional shows, and 12% were not interested in further programs, compared to 45%, 43% and 10%, respectively, for the whole group (Graph 3).

Many of the students had heard of Mr. Escalante through multiple sources. Most of the students who were familiar with Mr. Escalante had heard of him through the film "Stand and Deliver" (84%), while 32% had heard of him through television, 23% through newspapers and magazines and 23% through other sources.

Conclusion

This survey demonstrates that the response of students to the pilot presentation of the "FUTURES" video is remarkably positive. The three questions assessing interest of this program demonstrated a very positive response from these students.

Mr. Escalante does enjoy wide name recognition, which has a positive impact on the desire to watch additional shows in the series. However, the show itself is widely accepted even without this name recognition.

Taken in conjunction with additional research that is underway or planned -- both internally and independently conducted -- these findings should prove valuable in better defining the appropriate market audience and in designing video segments that will be positively received by that audience.

RESPONSE TO THE "FUTURES" VIDEO WORKSHOP

Dallas, Texas

March 9, 1991

Response to the FUTURES Video Workshop

Dallas, Texas; March 9, 1991

Key Findings

1. 96 teachers from the Dallas area participated in a full-day workshop co-sponsored by ARCO, the Department of Energy, and IBM.

2. This workshop focused on the use of FUTURES in the classroom and on forming partnerships between teachers and local professionals to help connect classroom math with the real world.

3. 94 teachers filled in surveys following the workshop.

4. 81% of these teachers rated the "Architecture and Structural Engineering" episode of FUTURES as Excellent, 17% as Good, and 2% did not answer.

5. 72% rated the "Statistics" episode of FUTURES as Excellent, 27% as Good and 1% did not answer.

6. The attendees reported that the best features of these programs were the focus on real-world application of math skills, the fast pace, the alignment of topics chosen with kid's interests, and the inspirational messages from engineers.

7. 78% of the teachers gave the overall workshop an Excellent rating while 21% rated it as Good and 1% did not reply.

8. The chance to view FUTURES and the opportunity to meet with local scientists and engineers interested in improving education were the best-liked features of this workshop.

9. 85% of the teachers felt more prepared to use FUTURES following this workshop.

10. 70% of the teachers rated the Teacher's Guide as Excellent. The best-liked feature of the guide was highly variable, with strong points being the overall organization, the variety and detail of sample questions, and the resource list of organizations which will provide additional information.

Response to the FUTURES Video Workshop

Dallas, Texas; March 9, 1991

One method of increasing the use of the FUTURES video series is through the participation of teachers and engineers in workshop programs. FUTURES workshops have been presented in a variety of formats, both at national conferences and as components of larger events. This report focuses on a workshop recently held at the Superconducting Super Collider Laboratory (SSC Laboratory) in Dallas, Texas. This event was hosted by KERA, the local PBS station, and the SSC Laboratory, a Department of Energy facility. The event was co-sponsored by ARCO, the Department of Energy, and IBM.

This workshop brought together 96 teachers from the Dallas area and an approximately equivalent number of other guests including engineers and principals. There were two key goals of the program: (1) To introduce teachers to the FUTURES video series and provide an intense training session on how this program may be incorporated into their classrooms and (2) to further strengthen the link between classroom math and future careers by enabling individual teachers to build partnerships with local professionals who can help the teacher connect classroom math with the real world of jobs, achievement and success.

Workshop Format

This workshop was the first full-day workshop for the FUTURES video series. The workshop went from 10:00 am to 2:30 pm with a one-hour break for lunch. It was moderated by Mr. Cliff Ishii. The program was very intensive. Teachers were thoroughly introduced to the series and were provided with extensive training in the use of the Teacher's Guide.

The program started with a composite video of the FUTURES series containing clips from various episodes including *Automotive Design*, *Sports Performance*, *Optics*, *Aircraft Design*, and *Fashion*. Mr. Ishii then introduced the FUTURES concept and the background to the series. Showing of the entire *Architecture and Structural Engineering* episode was followed by a brief introduction to the Teacher's Guide.

The workshop participants then paused for lunch. This provided an opportunity for teachers and engineers to establish direct communication. The lunch hour also included a presentation by Rich Stephens of the US Department of Energy (DOE), welcoming the teachers and describing the supportive role the DOE is playing in basic education.

Following lunch, the participants worked extensively with the series Teacher's Guide. This discussion focused on the ways that the guide could be used in the classroom to enhance math programs.

A second episode, *Statistics*, was presented following the Teacher's Guide session. Ms. Sherrie Kivlighn of the SSC Laboratory, Dr. John Kenelly of Clemson University and Mr. Phil Arbolino of the College Board Advanced Placement program then described how they could be used as additional resources by the teacher. This provided a model for the "Pros" section of the Teacher's Guide which lists organizations willing to provide additional information to teachers and students interested in their particular areas of expertise.

Teachers then filled in questionnaires regarding the workshop. (An example of this questionnaire is attached.) These responses form the basis for this report.

Demographics

Ninety-four teachers and administrators, representing 67 different schools in the Dallas area, filled in questionnaires. Survey respondents included one elementary, 48 junior high, 41 high school and one junior college teacher. Three respondents did not provide school affiliation.

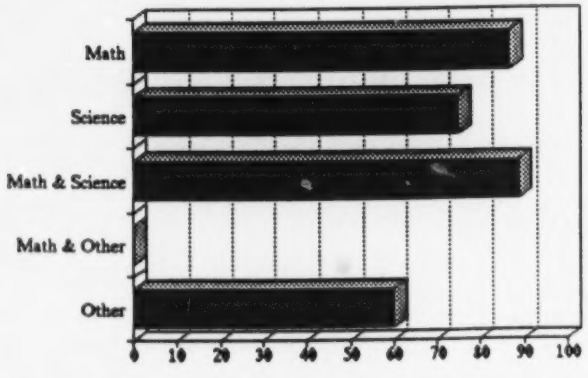
Sixty-eight of these individuals were math teachers, eight were science teachers, thirteen taught both math and another subject, three were administrators, and two did not state the subjects taught.

Ratings: The first thing these teachers were asked to provide was their rating of the FUTURES episodes they had seen. As shown below, the rating for the *Architecture* episode was quite high, with 81% rating it as Excellent and 17% as Good. No one rated this episode as either Fair or Poor. Two teachers had come in late and did not answer this question.

Rating of the Architecture Episode

There was very little difference between junior high and high school teachers in their ratings of this episode (81% vs 83% Excellent ratings). When separated by subject, however, there was a slight difference. 86% of the math teachers rated this episode as Excellent while 75% of the science teachers rated it as Excellent.

Excellent Ratings for Architecture
Separated by Subject Taught



Ratings for the *Statistics* episode were slightly lower than those for *Architecture* with 72% rating the episode as Excellent and 27% as Good. 1% did not answer. Again, no one rated this episode as either Fair or Poor.

Rating of the Statistics Episode

There was very little difference between junior high and high school ratings of the *Statistics* program (73% vs 75%). There was also little change dependent on subject taught, with 75% of both math and science teachers rating this program as "Excellent".

Best Features: Teachers had strong agreement regarding what they thought were the most appealing aspects of these programs. The concept itself, with its focus on the real-world application of math skills to motivate kids, was the favorite aspect of the *Architecture* program (33% of teachers). The fast pace, with its ability to hold the interest of kids, was second as the most appealing aspect (23%).

The clear association of geometric shapes with architectural design was also a favorite point. The common thread running through the message from engineers -- regarding the rewards of their own careers and the necessity for math skills in these careers -- was greatly appreciated.

The choice of both topics and guest speaker were repeatedly favored in the *Statistics* episode. The topics chosen were viewed as particularly relevant to kids (20%) and effective in relaying the importance of statistics to everyday life (26%). The choice of Mr. Arnold Schwarzenegger as a guest was also popular (21%). As one teacher noted, he is "the last person you would ever expect to wax eloquently about math and statistics -- marvelous idea!"

An added bonus of these episodes was the rejuvenation of some of these teachers. For example, the best part of the *Architecture* episode for one teacher was: "The motivation -- it made me inspired to keep on teaching!"

Suggested Changes: Teachers were asked if they would like to see anything changed in these episodes. 75% of the teachers either stated "No" or did not answer this question.

Of the replies, approximately the same number requested more detail on fewer topics (6%) as requested more applications be shown with little detail (4%). Although 22 teachers found the fast pace of this series to be its best feature, two requested a slower pace. Specific changes in personnel (two each for more of Mr. Escalante and less of Mr. Schwarzenegger), applications used (i.e. bring up architectural design in nature), or viewing conditions (a warmer auditorium) accounted for the balance of the suggestions.

The FUTURES Workshop

Overall Rating: Teachers were asked for their overall rating of the workshop. 78% rated this workshop as Excellent, 21% as Good and 1% did not answer. No one rated this workshop as either Fair or Poor.

Overall Rating of the Workshop

Best-Liked Features: Several teachers commented that they liked all aspects of the program or that the motivation gained from this workshop was its key attraction. However, most teachers did provide specific answers to this question.

The best-liked aspect of the workshop was viewing the FUTURES videos (36% of teachers). Close behind this was the opportunity to meet people, particularly scientists and engineers interested in improving education (20%). The speakers were well received by these teachers, with several appreciating the opportunity to get better informed regarding the resources available for improving their classrooms.

Least-Liked Features: Logistical considerations were the least-liked aspects of this workshop. The auditorium was too cold for 5 teachers and the sound system was poor at noon, restricting hearing of the lunch speakers. Five teachers suggested that an in-service day would be better than a full Saturday for this type of event. Two suggested a shorter event while two stated that this workshop was not long enough.

For the most part, these teachers had not been using FUTURES. Thus the main complaint for two of these teachers was that they didn't yet have the series. Specific suggestions for content included an increased focus on classroom implementation and curriculum fit.

Moderator Rating: The workshop moderator was rated as Excellent by 84% of the teachers and Good by 13%, while 3% did not answer the question. No one rated him as either Fair or Poor. In fact, although there was no space on the questionnaire to comment on the moderator, several teachers wrote comments in the margin such as "Rates as a 20 on a scale of 1 to 10" and "Terrific personality -- able to get and hold attention of audience".

Effects of this Workshop and Interest in Others: 85% of the teachers felt more prepared to use the FUTURES series in their classrooms following this workshop. 6% did not feel that this workshop made a difference. The balance were either uncertain or did not answer the question.

88% of the teachers were interested in the idea of satellite workshops through PBS, with 86% interested in having Jaime Escalante as a part of such a workshop. Mr. Escalante was favored due to his ability to motivate students and the interest by these teachers in incorporating his techniques.

The interest in satellite workshops should, however, be considered cautiously. One of the most favored parts of this workshop was the direct interaction with engineers. This element would be difficult to achieve with a satellite format.

The FUTURES Teacher Support Materials

This workshop provided an opportunity to gain detailed feedback on the FUTURES Teacher's Guide. Prior workshops had been shorter and less

intense in their review of the teacher support materials so that few comments could be obtained.

Teacher's Guide

Rating: The Teacher's Guide received 70% Excellent and 24% Good ratings in this survey, with 6% of the teachers not answering the question. No one rated the guide as either Fair or Poor.

Rating of the Teacher's Guide

Best Features: The best-liked aspect of the guide varied considerably. The overall organization was commended as clear and easy to use by several teachers. This facilitated inclusion of the guide in the normal curriculum.

A few teachers favored the show synopses and several appreciated the straightforward vocabulary review. The largest number of comments focused on the variety and depth of information regarding the problems and specific extracurricular suggestions in the guide. As these teachers stated, this detail facilitates the use of these problems and discussion points in the classroom.

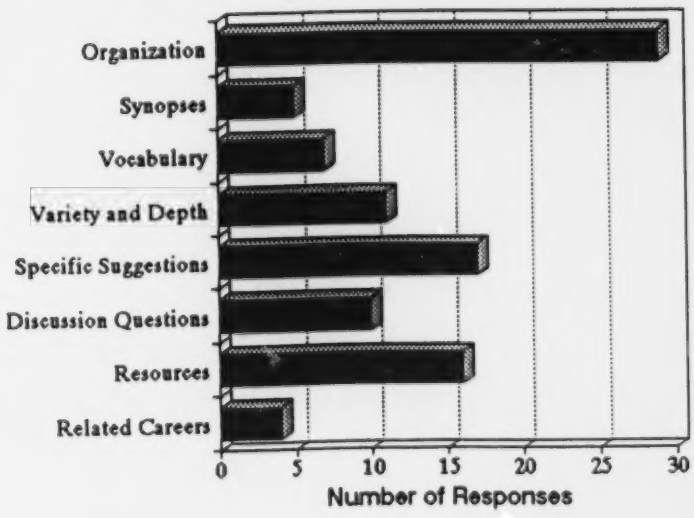
A few teachers appreciated the list of career options in specific fields. A very popular aspect was the inclusion of specific addresses for resources. These allow teachers to contact expert organizations that are willing to provide additional information on specific topics.

Areas for Improvement: Teachers were asked what they liked least about the Teacher's Guide and for ways to improve the guide. Increasing the ease with which the guide could be melded with current curriculum was the main focus of these replies.

The optimal guide would be designed to coordinate with the lesson plans of each type of class using the series: Requests for coordination with lesson plans were made by 7 teachers with 2 of these requesting that guides be created to align with different grades and subjects being taught.

Several teachers requested additions to the content of the guides. Eight requested more of everything, one the addition of problems on related

Favorite Aspects of Teacher's Guide



careers not included in the video, another the addition of equations specific to given occupations, three suggested more math or more detailed math in the problems given, and one the addition of reference materials where students might find further information on a topic.

Print format suggestions also frequented these two sections of the questionnaire. The chief suggestion for improvement of the guide (10 teachers - 40% of replies) was the addition of student materials. This suggestion varied from worksheets that could be photocopied for distribution to entire workbooks designed for distribution to each student.

Specific changes in the current design were also suggested. A few teachers (4%) found the print too small, one suggested that key topics be highlighted, two that the guide be bound on the long side to fit better as a notebook and two that the guide be constructed of more sturdy materials.

Poster

Rating: Teachers also rated the FUTURES poster. Unfortunately, not all of the teachers had had an opportunity to view the poster prior to filling in the survey. Therefore, 22% did not answer the question. Of those answering, 62% rated the poster as Excellent, 34% as Good, 1% as Fair, and 3% as Poor. These two individuals who rated the poster as Poor commented that they were not happy because there was no poster in their workshop packs.

Rating of the Poster

The main comments regarding the poster were that it was beautiful, colorful, and had wide appeal, especially to kids. Four teachers suggested that it had too much detail and needed to be either larger or broken up into more than one poster.

Conclusions

This workshop appears to have been very successful in introducing teachers to the FUTURES program. The initial response to this video series is quite favorable. This was the first opportunity to gain constructive criticism regarding the design and content of the teacher support materials. The overall design of these materials appears to be very useful. Several practical suggestions for improvement were made which, if implemented, will improve the quality of these support materials and the impact of the series as a whole.

FUTURES TEACHER SURVEY
DALLAS, TX MARCH 9, 1991

Name: _____ School: _____

Address: _____

_____ _____

Phone: _____ Subject(s) Taught: _____ Grade Level(s): _____

I. THE FUTURES SERIES:

A. 1) How do you rate the *Architecture & Structural Engineering* episode of FUTURES?

EXCELLENT GOOD FAIR POOR

2) What do you like best about this episode?

3) Would you like to see anything changed?

B. 1) How do you rate the *Statistics* episode of FUTURES?

EXCELLENT GOOD FAIR POOR

2) What do you like best about this episode?

3) Would you like to see anything changed?

II. THE FUTURES WORKSHOP:

1) Overall, how do you rate the FUTURES Teacher workshop?

EXCELLENT GOOD FAIR POOR

2) What part of the workshop did you like best?

3) What part of the workshop did you like least?

4) How do you rate the workshop moderator?

EXCELLENT GOOD FAIR POOR

(Please Turn Over)

5) Do you feel more prepared to use the FUTURES series in your classroom following this workshop? YES NO
Comments:

6) Would you be interested in a satellite workshop through PBS?
YES NO

7) Would you want Jaime Escalante to be a part of that satellite workshop?
YES NO
If YES, in what way?

III THE FUTURES TEACHER SUPPORT MATERIALS:

1) How do you rate the teacher's guide? EXCELLENT GOOD FAIR POOR

2) What did you like best about the guide?

3) What did you like least about the guide?

4) In what way could this guide be improved to be more useful in your classroom?

5) How do you rate the poster? EXCELLENT GOOD FAIR POOR
Comments:

6) How often do you currently show videos to each of your class(es)?
____ times/year.

7) Would you be interested in helping with a study measuring the effectiveness of the FUTURES Program? YES NO

THANK YOU FOR YOUR HELP!

FUTURES Student Surveys

Initial Report

December 1, 1990

Foundation for Advancements in Science and Education

FUTURES Student Surveys

Key Findings

1. 1,177 inner-city students from 33 junior high and high schools in the Houston area were surveyed after viewing two episodes of the FUTURES video series.

2. Over 60% of the students rated both the "Putting Man in Space" and the "Architecture and Structural Engineering" episodes of FUTURES as "Excellent". An additional 30% rated these episodes as "Good". Less than 0.2% of the students rated these episodes as "Poor".

3. This response was independent of gender.

4. Ratings were essentially the same for students whose favorite subjects were math, science or humanities. (Students with favorite subjects in both humanities and math or science rated FUTURES slightly higher than others.)

5. 99% of these students would recommend this series to their friends.

6. 98% of these students would like to see additional episodes of the series.

7. There was wide variation in the interest in specific topics currently available in the FUTURES series. In addition, there was definite variation in the appeal of different shows when separated by gender.

8. Student interest in possible topics for Season II, along with suggestions for topics of interest, were assessed.

9. Evaluations of student response to this series will continue, extending the student profile, assessing further episodes in the series, and expanding the list of potential topics for Season II.

FUTURES Student Surveys

Analysis of student response to the FUTURES program is one component of its ongoing evaluation. To accomplish this analysis, students have been surveyed following screenings of one or two episodes of the FUTURES series. This initial report tallies student responses to two FUTURES episodes.

The episodes analyzed herein are "Putting Man in Space" and "Architecture and Structural Engineering". They were shown during the precollege program of the Hispanic Engineers National Achievement Awards Conference (HENAAC), sponsored by NASA, in Houston, Texas on October 19, 1990.

I. DEMOGRAPHICS

Approximately 1,800 students from inner-city schools in the Houston area participated in this event. 1,177 of these students, representing 33 junior high and high schools, filled in questionnaires after the screening of the videos. The questionnaires (sample attached) requested that the students rate and comment on the two episodes they saw and assessed the student's interest in seeing further episodes of the FUTURES series.

62% (728) of the students filling in these questionnaires were female. 38% (445) were male. Respondents ranged in age from 10 to 20 years. (see Table 1)

The grades covered were 6th through 12th, with 56% of the students in 6th through 9th grades and 44% in 10th through 12th grades. (see Table 2)

TABLE 1
Range of Student Ages

Age	Students Number	Percent
10	1	0.1%
11	12	1.0%
12	105	8.9%
13	214	18.2%
14	203	17.2%
15	159	13.5%
16	170	14.4%
17	174	14.8%
18	79	6.7%
19	30	2.5%
20	8	0.7%
?	22	1.9%

TABLE 2
Range of Student Grades

Grade	Students Number	Percent
6	16	1.4%
7	216	18.4%
8	335	28.5%
9	75	6.4%
10	145	12.3%
11	201	17.1%
12	155	13.2%
?	34	2.9%

Students were asked to indicate their favorite subjects. 37% indicated that math was their favorite, 30% chose science and engineering as their favorites and 18% preferred humanities. 3% chose both

science or math and humanities subjects as their favorites. Another 3% chose other subjects, such as ROTC and homemaking. 10% did not answer the question. (see Table 3)

TABLE 3
Favorite Subjects

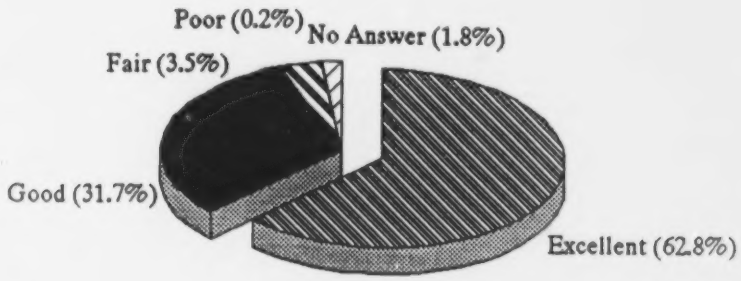
Subject	Number of Students
Math	430
Science	351
Humanities	215
Combination	30
Other	36
No Answer	112

II. RATINGS OF EPISODES

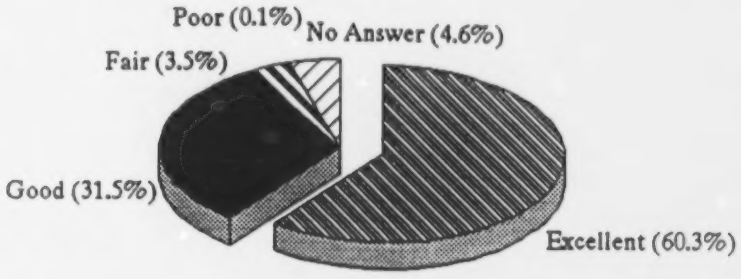
The overall response to these shows was extremely positive. 739 (63%) of the students rated the "Putting Man in Space" episode as "Excellent", while 710 (60%) rated the "Architecture and Structural Engineering" episode as "Excellent".

Male and female students rated these two episodes quite similarly. 66.5% of the male students gave "Putting Man in Space" an "Excellent" rating compared to 60.4% of the female students. The ratings for the "Architecture and Structural Engineering" episode were virtually identical for males and females, with 60.4% of the males and 60.2% of the females rating this episode as "Excellent".

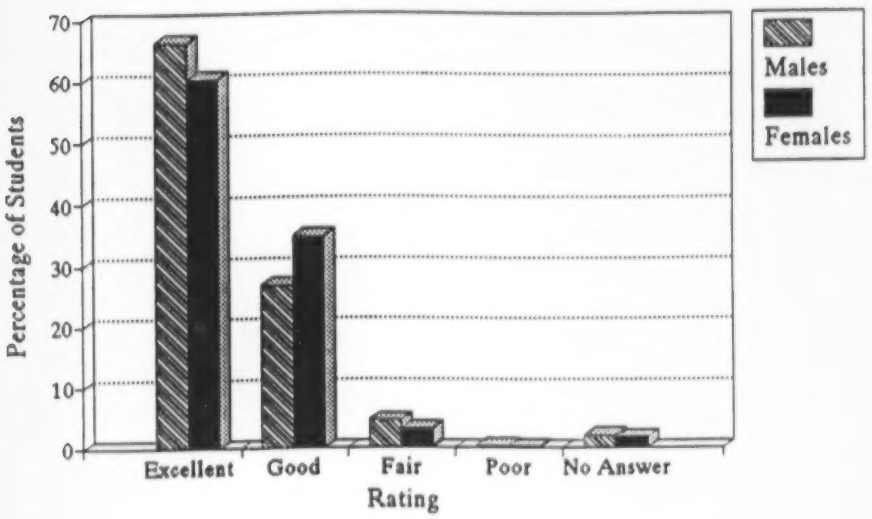
Ratings for "Putting Man in Space"



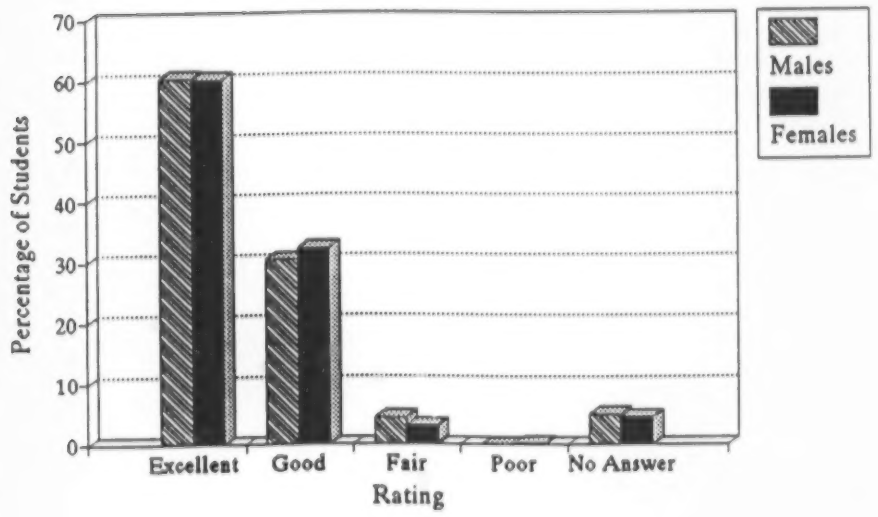
Ratings for "Architecture"



Ratings for "Putting Man in Space"
Separated by Sex

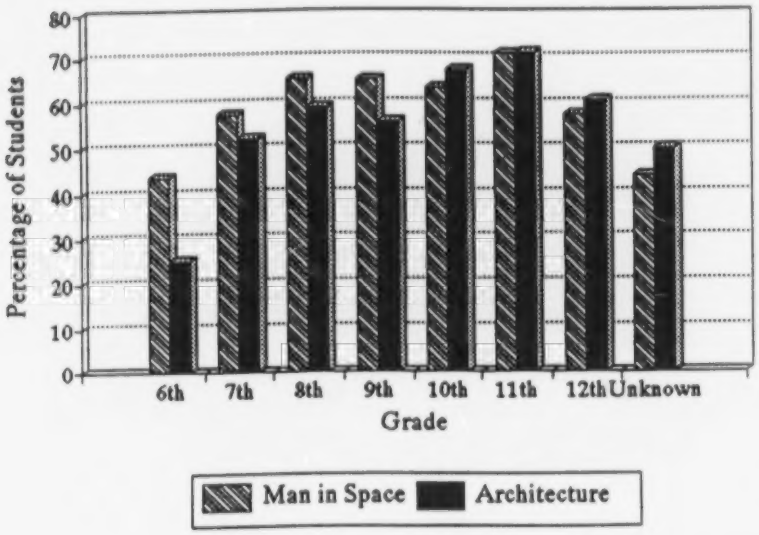


Ratings for "Architecture"
Separated by Sex



Separating these students by either age or grade gave similar results. Results separated by grade are shown. Both episodes were rated as "Excellent" by over 50% of the students in 7th through 12th grades while about 35% of 6th graders rated them as "Excellent". This variation in "Excellent" ratings was balanced by opposite tendencies

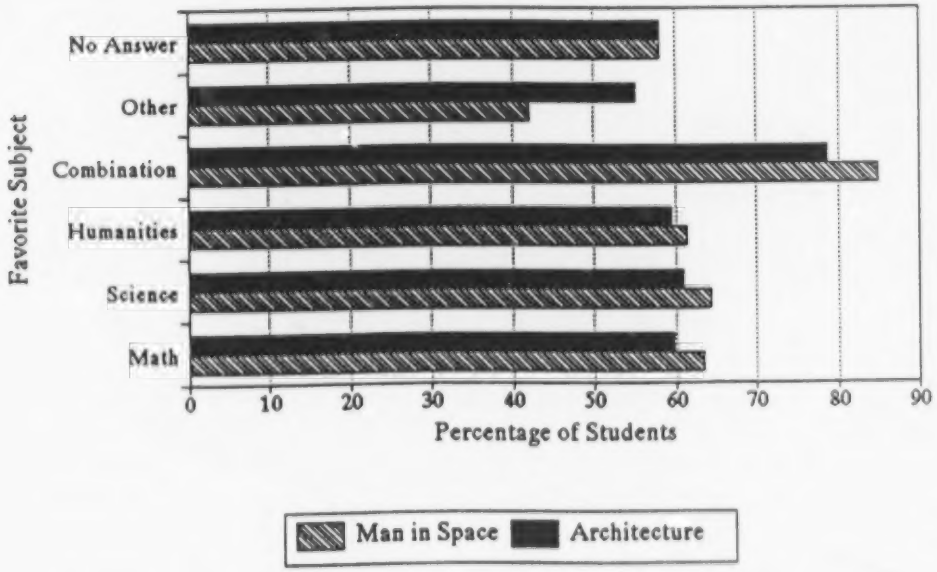
"Excellent" Ratings for FUTURES
Separated by Grade



in "Good" ratings. Overall, few students rated the shows as either "Fair" (3.5%) or "Poor" (0.13%). The fraction of students assigning these ratings did not vary conspicuously between grades.

This series is especially targeted for junior high school students. The "Putting Man in Space" episode was well received by both junior high and high school students. The "Architecture and Structural Engineer-

"Excellent" Ratings for FUTURES
Separated by Favorite Subject



ing" episode was especially appealing to high school students.

Ratings were also separated by favorite subject. There was little variation in the ratings between students choosing math or science as their favorite subject and those selecting humanities. The students who rated these programs the highest were those indicating that both technical subjects and humanities were their favorite subjects.

III. COMMENTS

For each episode, the students were asked what they liked best and whether they would like to see anything changed.

A. What Did You Like Best?

General comments that they liked "everything" or "all of it" were common in student answers to the question "What did you like best about this episode?" However, an abundance of specific replies were also given.

The clear winner for the "Architecture" episode was the rollercoaster sequence. Several students choosing rollercoasters did appreciate the linkage between structural engineering and the production of this ride. Most, however, simply stated "The rollercoaster".

Close behind rollercoasters in the "Best" ratings were the variety of buildings and the behind-the-scenes look at what it takes to produce these structures. In addition, many students commented that they favored the interviews with the engineers and the architect as these really told them what they needed to know in order to pursue such careers.

The response to the "Putting Man in Space" episode was quite different. As expected, the blastoff and space shots were appreciated. Shots showing astronauts training were also commended. Many students favored the classroom demonstration of math tricks given by Mr. Escalante. However, the notable change was in the number of students remarking that this program really brought home the involvement of people with every phase of the space program.

B. Would you like to see anything changed?

Students did not give many specific answers to this question. Key suggestions for the "Architecture" program were faster rollercoasters and a longer program. Exactly what was to be included in this lengthened version varied considerably. Students were about equally split between wanting more interviews and more action, more student examples and a complete change from the classroom.

The predominant suggestion regarding the "Putting Man in Space" program was that they wanted more details -- either a fuller description of a specific aspect of the space program or more information about the education required to get into these careers. In contrast, some students wanted more pictures of space without the explanations.

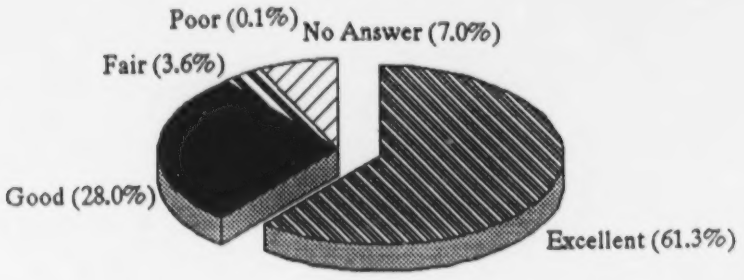
IV. POSTER RATING

The FUTURES poster is intended to appeal to teenagers and reinforce the message that there is a linkage between math and careers that they consider to be interesting and exciting. Therefore, it is important to know how these students rate the poster.

61.3% of the students gave the FUTURES poster an "Excellent" rating with another 28% rating it as "Good".

Many teachers have already stated that they will be hanging this poster in their classrooms.

Ratings for FUTURES Poster



IV. INTEREST IN ADDITIONAL PROGRAMS

To further assess their response to this series, students were asked two Yes/No questions:

(1) "Would you recommend FUTURES to your friends?" Of 969 students answering this question, 964 (99% of replies) said "Yes", they would.

(2) "Would you like to see other FUTURES episodes?" Of 971 students answering this question, 954 (98% of replies) said "Yes", they would.

Students were then asked to rate their interest in seeing additional episodes on specific topics.

A. Programs Already Produced

The first season of FUTURES consists of 12 episodes, each exploring one topic. Students were asked to rate their interest in viewing each of the episodes they had not yet seen as "Definitely Interested", "Maybe Interested" or "Not Interested".

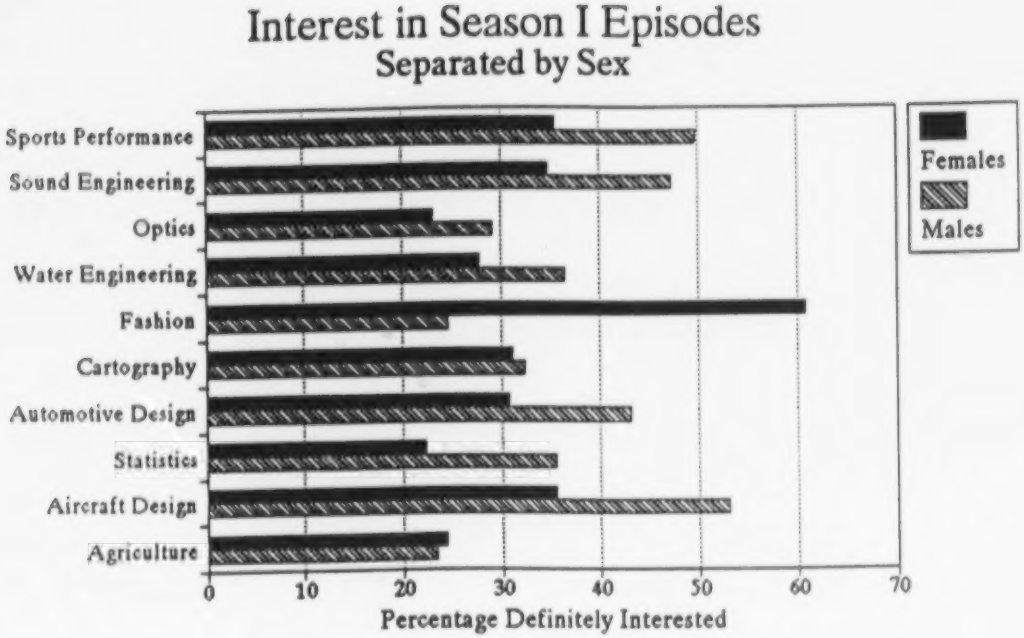
Many students answered only for those shows they were definitely interested in seeing. Therefore, only this rating is presented.

The interest in these shows varied considerably. Fashion, aircraft design, sports performance, and sound engineering were the most attractive topics, with around 40% of the students showing definite interest. Agriculture, optics and statistics were less appealing topics, with about 25% of the students showing definite interest in these subjects.

There were major differences in the relative appeal of these shows to males and females. In particular, the fashion show was definitely interesting to over 60% of the females while less than 25% of the males showed this level of interest. Several of these shows were favored by males, specifically aircraft design, sports performance, sound engineering, statistics and automotive design.

The interest in these topics did vary slightly for different ages or classes but there was no clear pattern in these variations.

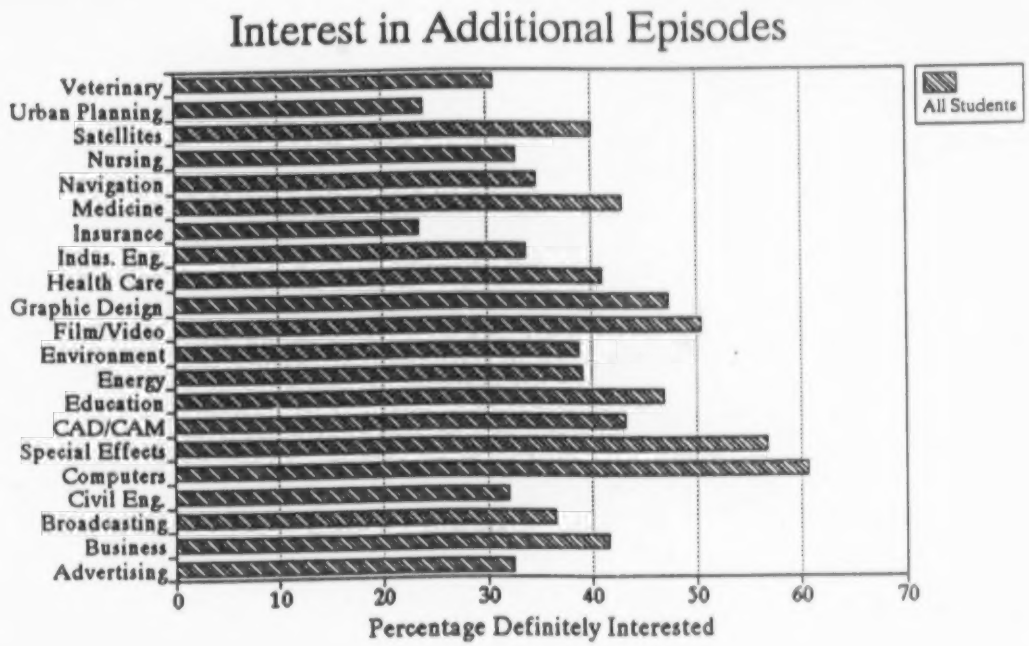
When separated by favorite subject, the pattern of interest varied for different topics. Students with interests in both math or science and humanities reported a greater interest in most topics than did the rest of the students. This was especially true for optics, sound engineering and fashion. The variations in interest for other topics were not as evident when separated by favorite subject.



B. Interest in Additional Topics

As one aspect of planning for the second season of FUTURES, students were surveyed regarding their interest in 21 potential topics for these episodes.

Computers, computer-generated special effects, and film/video were particularly appealing, with over 50% of the students showing definite interest in these topics. In contrast, insurance and urban planning were the least attractive topics, with less than



25% of the students reporting definite interest.

Additional topics suggested by students included animation, astronomy, bioengineering, chemical engineering, law, lasers, mass communication, music, robotic engineering, reporting, and future transportation.

The interests students report in surveys such as this one will be helpful when selecting the topics for the second season of the FUTURES program. In particular, this information will be helpful in choosing topics that appeal to both male and female students of the target age.

V. RECOMMENDATION

The student response to the two episodes they viewed was very favorable. In addition, they reported a strong interest in seeing additional episodes of the FUTURES program.

This type of feedback should be acquired for students from several locations throughout the country. As this evaluation continues, the survey instrument should be refined to more clearly communicate to students and modified to include new ideas for Season II topics.

HENAAC

FUTURES
STUDENT SURVEY
4801 Wilshire Blvd.
Suite 215
Los Angeles, CA 90010

NAME:_____ SCHOOL:_____

AGE:____ SEX: M or F GRADE____ TEACHER:_____

CLASS: Math____ Science____ Career Guidance:____ Other_____

FAVORITE SUBJECT :_____ DATE:_____

1. How do you rate the "Architecture & Structural Engineering" episode of FUTURES?

EXCELLENT GOOD FAIR POOR

2. What did you like best about this episode?

3. Would you like to see anything changed?

4. How do you rate the "Sports Performance" episode of FUTURES?

EXCELLENT GOOD FAIR POOR

5. What did you like best about this episode?

6. Would you like to see anything changed?

7. How would you rate the FUTURES poster?

Excellent Good Fair Poor

8. Would you recommend FUTURES to your friends? YES or NO

9. Would you like to see other FUTURES episodes? YES or NO

If YES, rate which of the these FUTURES shows you would like to see?

	[Definitely]	[Maybe]	[Not interested]
Agriculture	[ ]	[ ]	[ ]
Aircraft Design	[ ]	[ ]	[ ]
Automotive Design	[ ]	[ ]	[ ]
Cartography: The Art & Science of Map Making	[ ]	[ ]	[ ]
Fashion	[ ]	[ ]	[ ]
Water Engineering	[ ]	[ ]	[ ]
Optics	[ ]	[ ]	[ ]
Putting Man in Space	[ ]	[ ]	[ ]
Sound Engineering	[ ]	[ ]	[ ]
Statistics	[ ]	[ ]	[ ]

10. Would you be interested in seeing new FUTURES episodes on these subjects?

	[Definitely]	[Maybe]	[Not interested]
Advertising	[ ]	[ ]	[ ]
Business	[ ]	[ ]	[ ]
Broadcast engineering	[ ]	[ ]	[ ]
Civil Engineering	[ ]	[ ]	[ ]
Computers	[ ]	[ ]	[ ]
Computer special effects	[ ]	[ ]	[ ]
Computer Aided Design & Manufacturing	[ ]	[ ]	[ ]
Education	[ ]	[ ]	[ ]
Energy	[ ]	[ ]	[ ]
Environmental	[ ]	[ ]	[ ]
Film & Video Production	[ ]	[ ]	[ ]
Graphic Design	[ ]	[ ]	[ ]
Health care	[ ]	[ ]	[ ]
Industrial Engineering	[ ]	[ ]	[ ]
Insurance	[ ]	[ ]	[ ]
Medicine	[ ]	[ ]	[ ]
Navigation	[ ]	[ ]	[ ]
Nursing	[ ]	[ ]	[ ]
Satellites	[ ]	[ ]	[ ]
Urban Planning	[ ]	[ ]	[ ]
Veterinary Medicine	[ ]	[ ]	[ ]

Other ideas?_____

_____

_____

THANK YOU VERY MUCH!

FUTURES -- RESEARCH SUMMARY -- SPRING, 1992

Research Communications Ltd., an independent firm specializing in educational research, has just completed an in-classroom analysis of the FUTURES video series.

This study looked at the long-term effects of the FUTURES series under classroom conditions.

FUTURES was tested at four sites nationally between September 1991 and January 1992. Seven junior high schools participated in the study.

Half of the students viewed twelve different episodes of FUTURES in their math classes over the course of a semester while half did not view the series at all.

Students were surveyed before any episodes were viewed, in the week after the last episode was viewed and at a third time one month later. Christmas vacation fell between the two follow-up surveys.

88 students who saw FUTURES (users) were compared to 88 who had not seen the program (non-users).

Key conclusions:

FUTURES has a positive, long-lasting impact on student attitudes.

Students who view FUTURES are more likely to agree that math is relevant to careers than those who have not seen the series.

FUTURES positively affects student attitudes towards the relevance of science to careers as well.

Attitudes towards hard work and towards the possibility of having a successful career are more positive in students who have viewed the FUTURES series.

Students, especially minorities, rate the FUTURES series very highly. 59% of students rate the FUTURES series as better than other Instructional TV programs.

A. Effect of FUTURES on Student Attitudes Towards Math

One of the goals of FUTURES is to positively affect student attitudes towards math by demonstrating for them the link between mathematics and exciting careers.

To assess student attitudes, researchers asked students to respond to a series of eight statements regarding various school subjects. Students noted whether each of the statements was true or false for them.

The focus on math in this survey was disguised by having students respond to the statements (below) with not only "math" but also "art, drama, and/or music", "English, literature, and/or reading" and "science" inserted in the blank spaces.

The statements were:

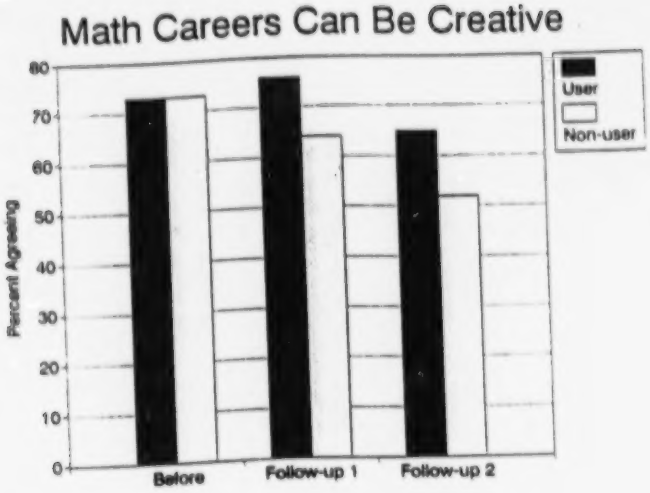
I will use a lot of what I learn in _____ someday in my career.
_____ is important to know about because so many careers require knowing and understanding it.
Improving my ability in _____ will help me to get where I want to go in life.
Knowing _____ will allow me to do some incredible and exciting things in my future career.
Careers that use _____ can be very creative.
I have enjoyed and looked forward to _____ class this school year.
Careers involving _____ will have the most jobs available to me.
_____ is something that is used in everyday life.

The response to these questions points out a broader trend in our educational system: As the school year progressed, students showed a definite drop in positive responses to these statements.

FUTURES was effective in mitigating and, in some cases, reversing this trend.

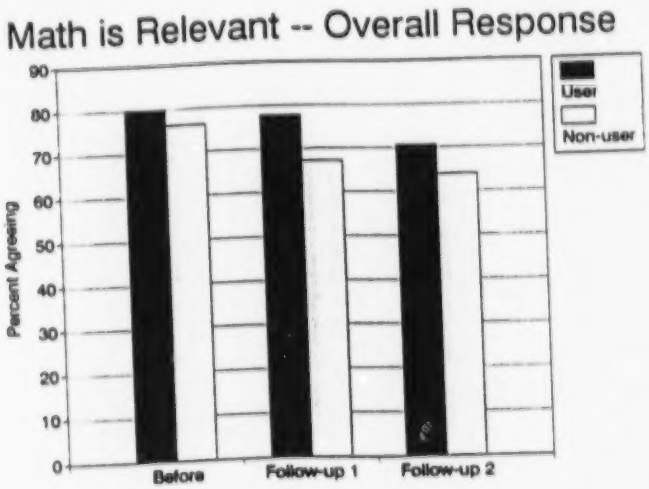
For example, prior to viewing FUTURES, 73% of both users and non-users agreed with the statement *"Careers that use math can be very creative."* The percentage of non-users who agreed dropped to 52% by study end – a 21% decline – while the percentage of users who agreed dropped to 65% – only an 8% decline (see graph, next page).

At study end, 13% more users than non-users agreed that math careers could be creative. This is a very positive influence on student attitude.



Similar changes were seen in response to other statements. On average, students who did not view FUTURES showed a 12% decrease over the course of this study in positive responses to statements regarding attitudes towards math. Students who did see FUTURES had only an 9% drop.

The average of these responses is shown in the graph below. The effect of FUTURES on student attitudes was quite marked at the first follow-up and was still evident at the second follow-up examination.



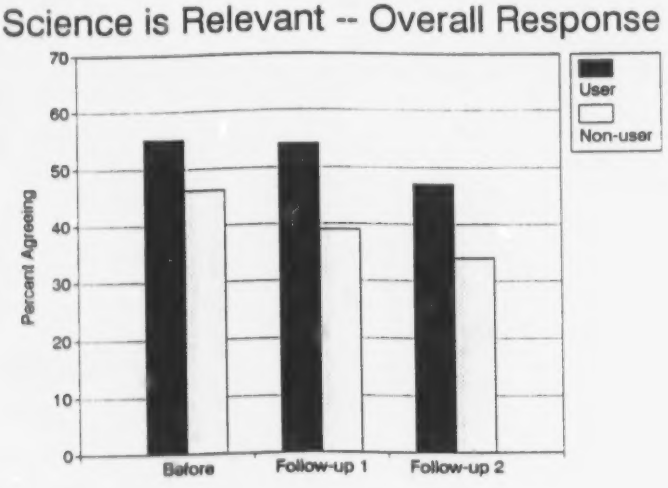
FUTURES does have a long-term positive effect on student attitudes towards math.

B. Effect of FUTURES on Student Attitudes Towards Science

An additional finding of this study is that FUTURES has significant positive effects on student responses to not only math but also science.

FUTURES was especially effective at maintaining student agreement that science is important to know about because so many careers require it. For this statement, positive responses of non-users dropped by 19% while positive user responses dropped by only 9% over the course of the study.

The average of positive responses to science statements is shown below.



Just as with math, FUTURES was effective in mitigating the trend for students to become less positive about their science studies as the school year progressed.

C. Student Attitudes Towards Careers

One feature of FUTURES is its stress on motivational concepts such as the student's ability to fulfill his/her dreams and the importance of hard work in achieving one's goals.

Students were asked whether they agreed or disagreed with a series of statements related to work or careers. They rated their level of agreement as "Strongly Disagree", "Disagree", "Neither Disagree nor Agree", "Agree" and "Strongly Agree".

The statements were:

I think it is important to "stick with" something once I start it, even if it requires hard work and is sometimes frustrating.
I like to imagine what careers I would like to do in the future.
I have a pretty good idea about what kind of career I would like to do in the future.
If I work hard, I can be anything I want to be.
I think I will someday have a career that I will love doing.
There are lots of things that have yet to be discovered or invented.
I think I will discover or invent something someday
There are many exciting careers I will be able to choose from.

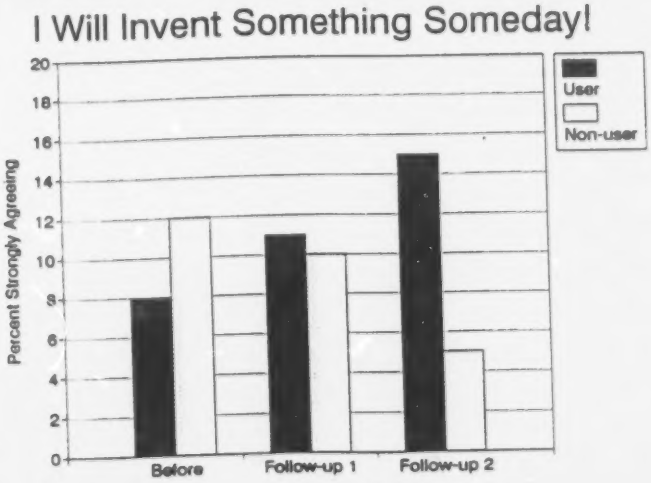
Students who had not viewed FUTURES showed a consistent trend towards less agreement with these statements as the school year progressed.

Again, one of the most encouraging findings was the effectiveness of FUTURES in offsetting this tendency.

This effect of the FUTURES series was most dramatically seen in response to two of the eight statements. The percentage of students agreeing (response of "Strongly Agree" or "Agree") with the statement *"If I work hard, I can be anything I want to be"* increased for FUTURES users from 85 to 90% over the course of the study. In contrast, the agreement from non-users dropped by 11% (from 96 to 85%) in this same time period.

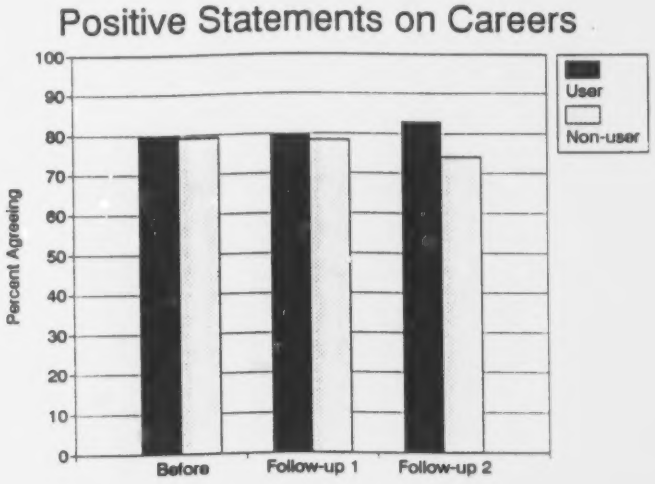
Similarly, the number of students agreeing with *"I think I will discover or invent something someday"* rose from 46 to 49% for users while dropping from 37 to 25% for non-users.

The effect of FUTURES was even more evident when looking at those who "Strongly



Agreed" with this statement. Users who strongly felt they would discover or invent something rose from 8% at the start of the study to 15% at study end. In contrast, non-users strongly agreeing with this concept dropped from 12% to 5% by study end.

Overall, the agreement with these positive statements about work and careers rose in the user group while dropping in the group who did not have the opportunity to view FUTURES. User agreement rose from 80 to 83% while non-user agreement dropped from 79 to 74% over the course of this study.



FUTURES does have a positive effect on student attitudes towards work and careers.

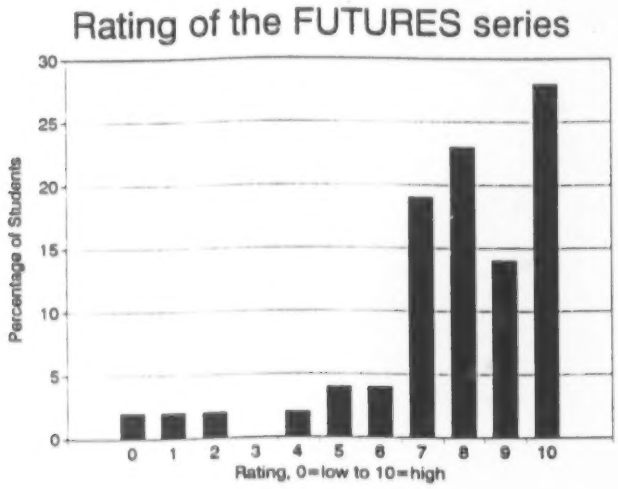
D. Effect of FUTURES on Career Choice

Minorities reported the best increases in interest in technical careers after viewing FUTURES: For those black students who saw FUTURES, interest in an engineering career went from 29 to 58% and in optical engineering from 9 to 23% while Hispanic student interest in architecture went from 28 to 65% after viewing the series.

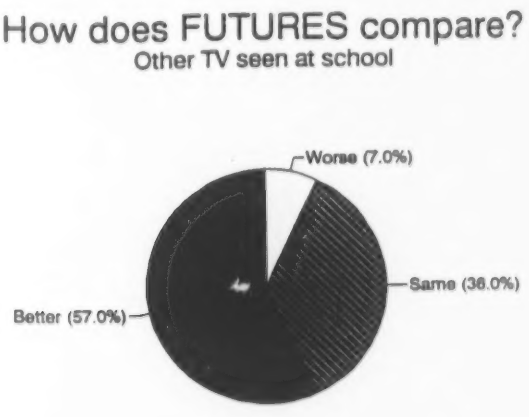
Overall, FUTURES did have a small, though not significant, effect on interest in the technical careers featured in the program. The interest of the total users group in both an engineering and an optical engineering career increased by 10% while such changes were not seen in the non-users.

E. Student Response to the FUTURES Series

The students' opinions of FUTURES were very favorable. Their ratings for how much they had enjoyed the series are shown here. The average rating was 6.7 at the first follow-up and 7.9 at the second follow-up survey.



The series was also rated highly in comparison to other television programs seen this school year. 93% of the students rated FUTURES as about the same or better than other educational programs.



Minority students gave especially high marks to the FUTURES series. (see table, next page) This was particularly true for Hispanics. Minorities also compared FUTURES more favorably to other Instructional TV. At the second follow-up, 70% of blacks and 79% of Hispanics stated the program was better than other programs seen in school.

RESPONSE TO FUTURES
Separated by Race

	Black	Hispanic	White
Average Rating (0=low to 10=high)			
First follow-up	7.3	8.1	6.1
Second follow-up	7.7	8.2	7.6
How does FUTURES compare to other Instructional TV Programs?			
First follow-up			
FUTURES is worse	11 %	0 %	13 %
FUTURES is about same	23 %	7 %	48 %
FUTURES is better	66 %	93 %	40 %
Second follow-up			
FUTURES is worse	3 %	0 %	14 %
FUTURES is about same	27 %	21 %	50 %
FUTURES is better	70 %	79 %	35 %

SUMMARY

FUTURES does positively affect student attitudes towards math, science and careers.

There are long-term benefits from employing FUTURES in the junior high school math program, benefits which instructional television is aimed at effecting.

This research directly supports the approach pioneered in the FUTURES program for improving student attitudes towards math.